METAL INDUSTRY

WITH WHICH ARE INCORPORATED

ALUMINUM WORLD — COPPER AND BRASS

BRASS FOUNDER and FINISHER

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Palmer Hall Langdon

PALMER HALL LANGDON, founder, editor and publisher of **Metal Industry,** died suddenly of a heart ailment at Kidney Pond Camps, Mt. Katahdin, Maine, September 18th. With Mrs. Langdon and their daughter, Louise, he had spent the summer at a Mt. Kineo camp on Moosehead Lake, and was returning from a tour of the Gaspe Peninsula, Canada.

PALMER HALL LANGDON
1868-1935

Mr. Langdon was born November 1, 1868 at 13 East Hamilton Square, Jersey City, N. J. When he was still a child his parents removed to Buffalo, N. Y., where he attended and graduated from Public School No. 14.

At the age of sixteen he determined to take up marine engineering, but was unsuccessful in getting employment in any of the marine machine shops of Buffalo or elsewhere. He finally secured work at the Rhode Island Locomotive Works, Providence, R. I., where at that time (1886) apprentices received six cents an hour for the first year, eight cents, the second year and ten cents, the third, the shops running ten hours a day. His first machine work was in the brass room of the plant. From the Rhode Island works he went to the Grant Locomotive Works of Paterson, N. J., then to the Hinckley Locomotive Works of Boston, Mass., both of these plants closing down while he was in their employ.

As the outlook in the locomotive shops at that time (1890) was not attractive and as electricity promised even then to become the leading motive power, he secured employment in the electrical factory of Frederick M. Kimball and Company, Boston, Mass., where he remained for several years, when the works ceased operations, the proprietor going with the General Electric Company. During his apprenticeship and machinist days he studied at the evening classes of the Massachusetts Institute of Technology and the Young Men's Christian Union in Boston, Mass. In 1900 when a resident of New York, he attended the first summer school of Columbia University and later, for one winter, took an evening course in chemistry at Pratt Institute, Brooklyn, N. Y.

In the Fall of 1892, Mr. Langdon decided to come to New York City, and see what he could find in the way of industrial openings. After a short connection

with a tile company, in which he lost the few hundred dollars he had collected, and having a liking for newspaper work, he secured a position as a reporter on one of the large metropolitan dailies, finally becoming New York correspondent of a Chicago paper.

In October, 1894, Frederick F. Burgin, who was an experienced daily newspaper man, started the trade journal known as The Aluminum World, and Palmer H. Langdon was engaged to write the metal market review for that journal. He afterwards bought the paper from Mr. Burgin who could earn more as a salaried member of the staff of a daily paper than in issuing a trade journal devoted to the then limited aluminum industry.

For eight years, with the aid of one assistant, Mr. Langdon issued the Aluminum World, but the field was found to be too small for even one industrial journal, and in 1903, in company with the late Erwin S. Sperry, metallurgist, of Bridgeport, Conn., he founded **The Metal Industry,** which was to be devoted to all of the metals except iron, and with which was merged the Aluminum World. The first issue was a small paper of twenty-eight pages and had a total distribution of only 2,000 copies. Accurate technical information on the non-ferrous metals was rather scant in those days and the paper met with approval from the start. With constant attention and improvement it has grown to an industrial publication of considerable size and influence.

In January, 1928, he acquired the journal, Brass World, which has since been changed to Platers' Guide with which is combined Brass World.

Mr. Langdon's life work was to strive to make each issue of **Metal Industry** better and more interesting. With the aid of able assistants he was successful in this effort.

Outside of his publication work, his principal pastimes were of an outdoor nature, such as skating, walking, riding, wheeling, sailing and other old-time sports. He did not care very much for the new pastimes requiring some form of mechanical power. He had made a number of remarkable trips such as a voyage to Honolulu in a square-rigged sailing ship, horseback riding trips through the Yellowstone Park and the Navajo-Zuni Indian Reservations; many canoe trips in the Maine Woods; a number of mountain climbs of the lesser peaks and other outdoor journeys, most of which he described in the publication Forest and Stream. For sixteen seasons he was a summer resident at Kineo, Moosehead Lake, Maine. When not engrossed in outdoor sports, his chief indoor pastime was reading. He loved good music and was a lifelong patron of the opera and drama.

He was associated with many organizations and societies, being a life member as well as a trustee of the American Scenic and Historic Society, and a life member of the American Association for the Advancement of Science, the Municipal Art Society, and the Appalachian Mountain Club.

He was a member of the American Institute of Mining and Metallurgical Engineers, the British Institute of Metals, the Brooklyn Institute of Arts and Sciences, the Brooklyn Museum, the Brooklyn Botanical Garden, the National Conference on State Parks, the Crescent Athletic Club of Brooklyn, the Brooklyn Chamber of Commerce, the Fresh Air Club of New York and the Citizens' Union of New York.

He was also a member of the American Foundrymen's Association and a recently elected Honorary Member of the American Electro-Platers' Society. He was a contributing member of Museum of the City of New York, Regional Plan of New York, Park Association of New York, Republican Associates of New York State, American Forestry Association and American National Red Cross.

In the summer of 1932, accompanied by his wife, he journeyed to Alaska, visiting many notable scenic resorts. This trip was described in the Crescent Magazine. In 1933, with his son and two guides he made the Maine canoe trip of the East Branch of the Penobscot River, making his eighteenth canoe trip in Maine inland waters.

In May, 1912, he married Louise Jean Hull who, with two children, Palmer Hull Langdon and Louise Helene Langdon, survive him.

The two journals **Metal Industry** and **Platers' Guide** will continue to be published as usual, without change, by the same staff which has been in direct charge for many years.

New Specifications

28 New Standards Approved as Tentative by American Society for Testing Materials

ON THE recommendation of a number of A.S.T.M. standing committees, Committee E-10 on Standards* at its meeting on August 22 approved for publication as tentative 28 new proposed standards, approved revisions in 14 existing tentative specifications and accepted for publication as tentative revisions in several standards.

Including the actions taken at the meeting, A.S.T.M. now has a total of 790 specifications, test methods and definitions of which 505 have been formally adopted as standards, while 285 are tentative. A year ago the total figure was 728.

Recommendations on new standards were submitted by committees functioning in the following fields: steel, iron-chromium-nickel and related alloys, copper and copper alloys, cement, hollow masonry building units, paints, petroleum products, road and paving materials, textile materials, methods of testing.

Revisions Submitted by Committee on Copper and Copper Alloys

At the annual meeting on the recommendation of Committee B-5 tentative specifications were accepted covering copper-silicon alloy wire for general purposes.

Revisions have been accepted in these specifications involving several advisable changes in physical properties. Tensile requirements range from 135,000 lb. per sq. in. minimum in the case of spring temper (up to ¼ in. incl. only) to 56,000-68,000 in the case of annealed material. Two tension tests and one bend test or grain size determination, where required, are provided.

Revisions Submitted by Committee E-1 on Methods of Testing

Minor revisions were accepted as developed by Committee E-1 in the Tentative Methods of Verification of Testing Machines clarifying certain sections of the methods.

Since criticisms of the Standard Specifications for Round-Hole Screens for Testing Purposes (E 17-33) resulted from the fact that there were no tolerances on plate thickness and spacing for openings, the tentative revision which was approved provides such tolerances and also requires triangular spacing.

Revisions in the form of proposed new tentative specifications will supersede the existing standard.

*Editor's Note.—This committee has as one of its major functions to pass upon proposed new standards and proposed revisions of existing standards offered between annual meetings in accordance with Society Regulations. The committee determines whether a concensus of opinion has been reached in the standing committee responsible for an item and determines whether the development has been in conformity with the A.S.T.M. Regulations.

National Metal Congress and Exposition

Well over two hundred companies reserved exhibit space at the National Metal Exposition, held in the New International Amphitheatre, Chicago, the week of September 30.

This year's Exposition was more than thirty per cent larger than that of last year. Practically every product, process and type of equipment used in the metal industry was displayed in the huge Amphitheatre. The entire space in the hugh Amphitheatre —more than four acres—was devoted to manufacturers' displays. Thousands of interested metal men were in Chicago during the week of Sept. 30 to attend the Exposition, which was open every day from twelve noon to ten p. m.

William A. Irvin, president of the United States Steel Corporation, has accepted the invitation to address the members of the American Society for Metals, at their annual banquet to be held Thursday, October 3, in the ballroom of The Palmer House.

In making this announcement, W. H. Eisenman, national secretary of the Society and Managing Director of the National Metal Congress & Exposition, pointed out that the annual banquet was one of the highlights of the Society's program during the week of the Metal Show, beginning September 30.

A full report of the non-ferrous features of this Congress and Exposition will appear in our November issue, which will include abstracts of papers, names of firms exhibiting and their exhibits.

Brass Forging Alloys

Q.—Can you give us a list of the mixture used for brass forgings?

A.—The range of copper zinc alloys that have the "true" brass color, and will forge readily, is a narrow one: 57 to 63 copper, the balance zinc will about cover this group.

The range of forging temperatures is also a narrow one.

Other copper alloys that can be forged are 91-95 copper, 9-5 aluminum; 98 copper, 2 tin; 99 copper, 1 cadmium; 80 copper, 20 nickel; 90 copper, 10 zinc.

—W. J. Pettis.

British Institute of Metals Meeting

Autumn Meeting in New Castle-on-Tyne, September 9-12, 1935. Papers on Brass, Bronze, Lead and Magnesium. The Nature of Creep

THE twenty-seventh Annual Autumn Meeting of the Institute of Metals was held in Newcastle-on-Tyne, by kind invitation of the North-East Coastal Local Section and local friends of the Institute, under the Chairmanship of the President, Dr. Harold Moore.

The proceedings began on Monday evening, September 9, when the **Fourteenth Autumn Lecture** on **Metal Melting—Its Effect on Quality**—was delivered by **Dr. H. W. Brownsdon,** in the King's Hall, Armstrong College.

In his lecture Dr. Brownsdon defined his idea of Quality, not in terms of specifications, but on much broader lines, namely, that a metal of high quality is that which meets the needs of the user to the fullest extent, making it clear that in one and the same metal or alloy very small changes in composition may render it suitable for one application and unsuitable for some other. From a metal melting point of view this control of quality became in effect a control of composition and that it is in this accurate control of composition that difficulties associated with metal melting arise. He then reviewed the numerous factors influencing the composition, dividing these up under the headings of Raw Materials, Contamination arising during Melting, Removal of Undesirable Constituents during Melting and finally Some other Factors bearing on Quality. He drew a simile between what the metallurgist has to do for the prevention and removal of undesirable constituents in molten metal with the part played by the surgeon in the curing of human ills, and referred to the melting pot as the operating table of the metallurgist, pointing out the many difficulties that the metallurgist is met with in the satisfactory carrying out of melting operations. It was shown that in metal melting it is the little things that matter and that in spite of all the scientific investigational work that has been done on molten metals, some of their secrets still remain unrevealed. He then dealt with methods adopted for the removal of undesirable impurities, again stressing the difficulty of obtaining the desired object. Under this heading such subjects as the use of deoxidizing agents and fluxes, treatment with gases, and vacuum melting came under review. Perhaps one of the most difficult operations that the metallurgist has to face in the melting of metals is to free them from gases and special reference was made to this aspect of metal melting. Finally other factors bearing on quality were referred to.

Abstracts of Papers

OBSERVATIONS OF THE POROSITY AND SEGREGATION OF TWO BRONZE INGOTS

By N. P. Allen and S. M. Puddephat

The distribution of porosity and the variation in copper content in two 10 per cent tin-bronze ingots have been found to be influenced principally by the flow of heat during solidification. There was a close connection between the porosity and segregation of the ingots.

METAL LOSSES IN MELTING BRASS AND OTHER COPPER ALLOYS

By Maurice Cook

A study has been made of the metal losses which occur when such alloys as gilding metals, brasses, and cupro-nickel are melted in crucibles in coke-fired pit furnaces, and for this purpose figures have been obtained both from carefully controlled trials and from production runs, involving the melting of considerable quantities of material under different conditions.

Observations have also been made on the metal losses occurring in melting brasses of different compositions under various conditions of fluxing in Ajax-Wyatt induction furnaces, and large-scale trials covering considerable periods and involving large tonnage of metal have been made. The loss is largely due to oxidation and the results of various methods of reducing the loss, such as varying the nature and amount of flux, the use of charcoal, coke, anthracite, and coal-gas, which have been tried are discussed.

THE PROPERTIES OF SOME SPECIAL BRONZES

By Professor D. Hanson and M. A. Wheeler

Additions of aluminum, manganese, aluminum plus manganese, iron and silicon have been made to copper-tin bronzes.

(1) **Aluminum.**—Within the range of compositions investigated, alloys consisting of one solid solution work readily, hot or cold. Alloys possessing a duplex structure can be worked with much greater difficulty, and are specially difficult in hot-working. The range of compositions in which easy working properties can be obtained can be extended by annealing duplex alloys to give a homogeneous structure.

Annealed alloys possess very good ductility; the maximum tensile strength attained in annealed alloys was 30 tons/in.² in an alloy containing 4 per cent aluminum and 5 per cent tin. Alloys containing 2 per cent or more aluminum are fairly resistant to oxidation at high temperatures, particularly if the cast surface is not damaged. Polished alloys have a pleasing appearance, and are fairly resistant to tarnishing in the air. The scale formed when the alloys are heated is very difficult to remove, either mechanically or by pickling processes.

(2) **Manganese.**—Manganese has a relatively small influence on the working properties of a 5 per cent tin bronze. As much as 6 per cent of manganese must be added before an appreciable embrittling effect is apparent. Alloys within the range of composition investigated can be worked hot or cold.

Manganese increases the softening temperature of the tin bronzes.

(3) **Aluminum and Manganese.** — Copper-tin bronzes containing aluminum and manganese, within the range investigated, are difficult to cold-work, without annealing, if the aluminum content exceeds about 0.25 per cent. With aluminum contents up to about 3 per cent they may be cold-worked if they are previously rendered homogeneous in structure by annealing. Aluminum increases the tensile strength of manganese-tin bronzes, without appreciably reducing the ductility.

(4) **Iron.**—Iron, in the form of American washed iron, alloys readily with copper, and 4 per cent of iron can be incorporated without difficulty. No trouble was experienced in obtaining good castings. Iron-tin-copper alloys containing 5 per cent of tin and up to 4 per cent of iron can be rolled, and the ductility decreases only slightly even when 3 or 4 per cent of iron is present. Iron up to 1.5 per cent has little effect on the tensile properties of a 5 per cent tin bronze, but 2 per cent or more of iron increases the tensile strength at the expense of the ductility. The iron is distributed uniformly throughout the solid alloy in the form of small particles, the structures being very similar to those of iron-copper alloys containing no tin. 4 per cent of iron greatly refines the cast structure of a 5 per cent tin bronze.

(5) **Silicon.**—Silicon has a marked effect on the cold-working properties of a 5 per cent tin bronze. An alloy containing 3 per cent of silicon can be cold-worked only with great difficulty in the "as cast" condition; after annealing at 800°C. for 4 hrs. the cold-working properties are slightly increased. The addition of 4 per cent, of silicon to a 5 per cent tin bronze renders the material unworkable both hot and cold. The addition of silicon greatly increases the strength of a tin bronze.

AN X-RAY INVESTIGATION OF CERTAIN COPPER-TIN ALLOYS

By Professor E. A. Owen and John Iball

The α-phase boundary of the copper-tin alloys has been determined by x-ray analysis between 750° and 300° C. Its position between 750° and 500° C. is moved in the direction of slightly higher tin content, but between 500° and 300° C. in the direction of lower tin content than that of the boundary as previously determined. The maximum solubility of tin in copper occurs at about 520° C., the temperature corresponding to the (β) to ($\alpha + \gamma$) transformation. The parameter of the γ-phase is found to lie between 17.917 and 17.924A at 480° C., but the measurements are not considered sufficiently extensive to decide whether there exists a definite region of solubility for this phase. The ϵ-phase is a solid solution the range of which does not exceed 1.5 per cent copper by weight at 380° C. The atomic volume of the copper-saturated ϵ-phase at this temperature is found to be 14.124A.³ and that of the tin-saturated phase 14.177A.³ The results so far obtained suggest that a transformation of (γ) into ($\alpha + \epsilon$) occurs at a temperature slightly higher than 300° C., and that the copper-saturated boundary of the ϵ-phase is not exactly vertical between 380° and 300° C.

THE INTER-RELATION OF AGE-HARDENING AND CREEP PERFORMANCE. PART I.—THE AGE-HARDENING OF NICKEL-SILICON COPPER ALLOYS

By C. H. M. Jenkins and E. H. Bucknall

With an Appendix on The Relationship of Time, Temperature, and Concentration as Factors in Age-Hardening, by E. H. Bucknall and C. H. M. Jenkins.

A report is given of an investigation on the age-hardening of nickel-silicon-copper alloys containing 3 and 5 per cent nickel + silicon in the atomic ratio 2 Ni: 1 Si. This work which was carried out as a preliminary to the study of the inter-relation of the age-hardening of this material and its creep performance, has provided sufficient information to serve as a basis for the creep test program and to assist in the interpretation of the creep results.

The alloy containing 3 per cent nickel + silicon when quenched from 900° C. undergoes age-hardening at temperatures of 300°-750° C. The maximum hardness is attained progressively more rapidly the higher the aging temperature, being reached, for example, in more than 64 days at 400° C. and in less than 1 minute at 700° C. In general, a linear relationship appears to apply between the logarithm of the time and the reciprocal of the absolute temperature of attainment of maximum hardness. The maximum hardness is greater the lower the aging temperature. The attainment of maximum hardness is generally followed by softening.

Microscopical and chemical evidence of the progress of aging has been obtained, but x-ray study has not been of great assistance in this instance.

In the Appendix consideration is given to points relating to the age-hardening of nickel-silicon-copper alloys and their comparison with information in the literature relating to other age-hardenable alloys. Particular attention is directed to the importance of the relationship between temperature and time of attainment of maximum hardness, which is shown to be of general application. A similar relationship applies to the attainment of maximum resistivity during aging. These relationships are regarded as confirming the commonly accepted theory of age-hardening.

NOTE ON THE EFFECT OF INTERRUPTED STRAINING ON THE ELONGATION OF LEAD

By J. C. Chaston

It has been found that by interrupting a tensile test on commercially pure lead at intervals, during which the specimen is allowed to rest for a short time free from stress, abnormally high values of elongation are produced. These may be as much as five times those obtained in a normal tensile test. The influence on the elongation of the duration of the rest period, the rate of straining, the amount of elongation between successive rest periods, and the grain-size have been studied by tests on extruded cable-sheath samples. Abnormal elongations are not produced by

interrupted straining on "hardened" lead alloys at room temperature, but it is suggested that such effects may be obtained in these and any other metals and alloys if they are tested above their recrystallization temperatures. The observations recorded may thus have a bearing in connection with high-temperature metallurgical research.

AN INVESTIGATION OF THE NATURE OF CREEP UNDER STRESSES PRODUCED BY PURE FLEXURE

By H. J. Tapsell and A. E. Johnson

The paper deals with the results obtained in a study of the stresses and strains arising when a material is subjected to bending moments in conditions which produce creep. For experimental reasons, it was necessary to use a material which would creep at air temperature, and for this reason lead of commercial purity was chosen. Apparatus was constructed by which a beam of lead was subjected to uniform bending moment, and measurements of the creep of the beam were recorded. The whole equipment was housed in a chamber maintained at constant temperature. Tensile creep tests on the material of the beam were also carried out at constant temperature in order to provide stress-strain data for the calculation of the stresses in the beam.

The investigation led to the following conclusions: (1) in the case of a lead beam creeping under stresses produced by pure flexure, plane sections continue to remain plane; (2) the redistribution of stress arising from creep is complete within one-fifth of an hour after application of a bending moment, and the stresses continue unaltered with time; (3) the behavior of the beam under flexure may be fairly computed solely from the relations between tensile stress and rate of strain corresponding to any period of tensile creep testing on the material of the beam.

THE PROTECTION OF MAGNESIUM ALLOYS AGAINST CORROSION

By H. Sutton and L. F. Le Brocq

Short-time chromate treatments of magnesium-rich alloys of two types in common use have been investigated, and the protective value of the treatments has been compared with the 6-hr. chromate treatment and other forms of protective treatment.

A bath has been evolved capable of giving good films in 30-45 minutes, and which is suitable for use in steel or aluminum tanks.

The protective value of the 6-hr. and short-time chromate treatments, with and without supplementary coatings of varnishes and enamels, has been investigated with reference to typical alloys. Intermittent sea-water spray laboratory tests and beach exposure tests were carried out, and the corrosion which occurred was observed by loss of weight and change in mechanical properties.

Experiments were carried out on the influence of cleaning treatments employed before chromate treatment.

CORROSION BELOW DISCONTINUOUS OXIDE COATINGS WITH SPECIAL REFERENCE TO MAGNESIUM

By K. G. Lewis and U. R. Evans

Protective processes fall into two classes: (a) safe processes, where even incomplete treatment lengthens the time of perforation; (b) dangerous processes, where inadequate treatment intensifies attack and brings quicker perforation than no treatment.

Magnesium, uncoated and coated with oxide layers produced by three different treatments applied for numerous different periods, has been subjected to sodium chloride in a new circulating apparatus. Time-corrosion curves and perforation periods have been obtained. The data show that these processes belong to the "safe" class.

ELECTRON DIFFRACTION EXAMINATION OF PROTECTIVE FILMS DEPOSITED ON MAGNESIUM AND MAGNESIUM ALLOYS BY THE R. A. E. DICHROMATE PROCESS

By H. G. Hopkins

The protective films, in general, yielded diffuse diffraction rings. It is concluded that the films consist of very small crystals oriented at random. It is tentatively suggested that the diffracting lattice is pseudomorphic magnesium oxide.

ALLOYS OF MAGNESIUM. PART. III.—CONSTITUTION OF THE MAGNESIUN-RICH ALLOYS CONTAINING ALUMINUM AND CADMIUM

By Dr. J. L. Haughton and R. J. M. Payne

The addition of cadmium to magnesium-aluminum alloys depresses the liquidus slightly, 20 per cent cadmium lowering the liquidus temperature of an 80 per cent magnesium—20 per cent aluminum alloy by about 50° C., but has practically no effect at the temperature of the aluminum-magnesium eutectic. It also reduces the solubility of aluminum in magnesium to a small extent. No new phases are found up to 20 per cent of each added element, but attention is directed to an abnormal form of precipitation which was found in some of the alloys.

X-RAY STUDY OF COPPER-SILVER ALLOYS

By Professor E. A. Owen and Joseph Rogers

The phase boundaries in the thermal diagram of copper-silver alloys have been determined by the x-ray method. A general survey showed that the phase fields were the same as those in the generally accepted diagram of the system. More detailed investigation with the precision x-ray camera yielded accurate values of the solubilities of copper and silver in each other. These values are compared with the more recently determined values, with which they are found to be in fair agreement. The solubilities of copper in silver and of silver in copper at 778° C. are found, respectively, to be 8.5 and 8.4 per cent. These solubilities decrease to 1.8 and 1.4 per cent at 500° C. and to 0.2 and 0.1 per cent at 200° C. The extrapolated experimental curves indicate that the one metal is almost insoluble in the other at room temperature.

THE DETERMINATION OF CERTAIN PHASE BOUNDARIES IN THE SILVER-ZINC THERMAL DIAGRAM BY X-RAY ANALYSIS

By Professor E. A. Owen and I. G. Edmunds

The phase boundaries in the region extending from the γ— to the ϵ-phase of the silver-zinc thermal diagram, have been determined by x-ray analysis. The crystal parameters are accurate in general to 1 part in 5,000; in some of the determinations the accuracy is much higher than this. The results confirm the existence of the phase fields contained in the generally accepted diagram of the system, but they indicate that the positions of the boundaries need readjustment. The (γ)— $(\gamma + \delta)$ boundary requires adjustment in the direction of lower silver content, by about 0.5 per cent silver by weight at the lower temperatures, and

by a progressively greater amount in the opposite direction as the temperature is increased. The $(\gamma + \delta)$ — (δ) boundary needs to be displaced towards the silver end of the diagram through about 4 per cent in composition, thus reducing the width of the $(\gamma + \delta)$ region to about half its former value. The (δ) — $(\delta + \epsilon)$ and (δ) — $(8 + \pi)$ boundaries are more nearly parallel to the temperature axis than those shown in the thermal diagram published in the International Critical Tables. At the higher temperatures the (δ) — $(\delta + \pi)$ boundary moves towards the silver end through about 4 per cent in composition. The $(\delta + \epsilon)$ — (ϵ) boundary is parallel to that in the accepted diagram, but needs an adjustment of about 1 per cent towards the silver end of the diagram.

NOTE ON THE FAILURE OF A GOLD FUSE IN CONTACT WITH NICKEL-CHROMIUM ALLOY

By M. C. Caplan

The failure of a gold safety fuse to operate at the correct temperature was found to be due to diffusion taking place between the gold link and the nickel-chromium connections at temperatures of 950°-1,000° C. An alloy of lower melting point is formed which offers little resistance to oxidation, and finally the gold link becomes disintegrated and converted into a cindery residue.

PRODUCTION OF POWDERED ALLOYS OF LOW MELTING POINT

By R. W. Rees

A method is described for producing lead-base alloys in the form of powder. For this purpose advantage is taken of the pasty stage through which the alloys pass during solidification.

NOTE ON THE TARNISHING OF LIQUID METALS AS STUDIED BY X-RAYS

By Hugh O'Neill and G. S. Farnham

An apparatus has been constructed for the x-ray study of liquid metals up to 700° C. by surface reflection. Spectrograms taken with Cu x-radiation in an atmosphere of hydrogen just above the melting point of lead, tin, and SnSb showed the structure of surface tarnish films. Preferred orientation effects were observed. On heating to higher temperatures the tarnish was reduced in thickness, and the Debye ring of the liquid metal replaced the x-ray spectrum of the tarnish.

Metal Spinning

The most recent application of spinning has been applied to the process of making very large heads for tanks out of ⅜ inch corrosive resistant metals. These tanks are used for liquids, for foods and for drinks, and also for liquids in laundries and various other establishments. Some of these bulged heads are nearly 200 inches in diameter, and they are spun from circular sheets of metal on vertical spinning lathes.

Thousands of articles of all sizes and for all purposes are also spun from thin sheet metals of various kinds. The equipment for spinning is fairly well described in the catalogs of the builders of the machines.

There are no extensive reference books on the subject. While the operation of spinning is quite simple, yet in order to be successful with the various kinds of metals, it is necessary to have some knowledge of the quality of the metals and how they should be heat-treated in order to keep them soft and from tearing.

W. B. Francis.

Spinning vs. Stamping

Q.—Could you tell me if an article like a doughnut cutter could be made cheaper of spun aluminum or stamped aluminum and if the machinery for spinning would cost more than dies?

A.—This cutter can be spun as well as stamped and drawn, but the quantity must be quite large in order to use a set of dies and a press to advantage. Sheet aluminum can be handled by either process, but the use of aluminum is objectionable in some of the bakery processes because it produces a dark stain on the raw dough. Extra heavily coated tin plate might be preferable, and stainless steel would be unexcelled.

The die set and press would be more expensive than the spinning equipment, and especially so if you have a lathe of any kind on hand. We would suggest that you turn up a hard wood block having the same form on the end of the grain as the inside of the required cutter. Mount this wood form in a lathe chuck and revolve it as rapidly as possible.

The disc of sheet metal would be held against the end of the wood form by a flat tailstock center. The spinning tool must have a smooth end with the shape of spoon and a long handle that would reach under the arm of the operator. Clamp a bar or long tool shank in the tool post and rest the spinning tool on this bar. A strong lever action against the side of the revolving disc is required. The pressure will gradually cause the disc to take the shape of the wood former block. Try using a tin disc, such as from a can bottom or top, and spin a saucer shaped piece over the end of a wooden form.—**W. B. Francis.**

Pickling Phosphor Bronze

Q.—We should be very much obliged if you would kindly furnish information as to the best means of pickling and cleaning phosphor bronze sheet.

We have not found the sulphuric acid pickle satisfactory for this purpose and the nitro-sulphuric bath very rapidly loses its strength and efficiency.

A.—The process of cleaning phosphor bronze sheets, satisfactorily, requires a secondary pickling operation.

After the regular sulphuric acid pickling, they are treated in a bath made of a 10% solution of sulphuric acid with ¼ to ½ lb. of sodium bichromate added to each gallon of the solution.

The general practice is to heat the solution with live steam.—**W. J. Pettis.**

New Copper House

Kennecott Copper Sudsidiary Shows Their Answer to the Housing Problem

COPPER HOUSES, INC., a subsidiary of Kennecott Copper Corporation, one of the leading American producers of copper, announce their plans to encourage the building of moderately priced copper houses.

First Copper House

The company has completed its first copper house at Bethesda, a suburb of Washington, D. C. It is now open for public inspection. This copper house is the first of its kind to be built in this country. It is of the English farm house type. Copper Houses, Inc., has prepared plans for a number of houses in Colonial and other styles of architecture, which they feel will harmonize better than modern houses with the finer type of American residential districts.

Low Cost Construction

Comparing copper houses with the same designs in brick, or wood, the comparison would be distinctly favorable to copper. The present designs which have been planned range upward from approximately $4,500. The model house now being shown represents one of the larger houses.

Copper Walls Too

While copper has been used for roofs, roof gutters, and water pipes, for many years, it is now the main basic material of the house itself for the entire outside of the house is made of copper. The outside walls, the roof, and roofing accessories, are all of this enduring metal. In addition the plumbing lines, heating lines, radiation, hardware on the inside of the house will also be of copper, or copper alloys. The result will be a house well protected against deterioration.

New Method of Joining Copper Sheets

The framework of the house is of structural steel. The outside walls consist of heavy copper plates backed by a half inch thickness of composition board, which lends additional stability to the sheets, and minimizes any metallic noise when the plates are struck. Its plates are fastened to the structural steel and uprights by means of a special bronze holding strip upon which patents have been applied for. This special method of attachment not only holds the sheets of copper tightly together, but also provides for both horizontal and vertical expansion, and at the same time gives an absolutely weather-proof and insect-proof connection.

The roof is covered with regular sixteen ounce sheet copper over a wood deck, and heat and cold insulation is provided for by a four inch thickness of spun glass inside the walls and roof.

All the plumbing pipes in the house are of non-rusting copper tubing, and the plumbing fixtures are chromium plated brass to resist tarnish. The house is also provided with a complete air conditioning system, which will keep the house with warm moist air in the Winter time, and dry cool air during the hot Summer months, and with the air mechanically filtered and cleaned throughout the year. This air conditioning system has been installed in all the principal rooms of the house, and rooms such as bath

NEW COPPER HOUSE.

The Copper House is a new development in house construction. It has copper exterior walls instead of wood or brick. This house illustrates one of the larger copper houses.

rooms and kitchens, closets and maid's room have been provided with concealed copper radiators that are concealed in the walls.

Copper alloys are further used in the bronze screens for all windows and doors, and in the heating pipes, and all the hardware, and in the lighting fixtures. The house is announced as weather-proof, rust-proof, fire-proof, lightning-proof, sound-proof and termite-proof

The address of the company in Washington is at the Rust Building, 15 and K Streets N. W., and its main office is at 10 East 40th Street in New York City.

Remington Rand Improves Parts, Reduces Costs With Electric-Furnace Brazing

THROUGH the use of a small, General Electric batch-type electric furnace for the copper-brazing in a controlled atmosphere of more than 150 machine parts for adding and accounting machines, the Dalton-Powers Division of Remington Rand, Inc., located at Norwood, Ohio, is said to be making substantial savings in production and service costs. The strength, quality, and life of the parts have been materially improved by the process. Four of the parts provide particularly good examples of the advantages afforded by the electric-furnace method of brazing.

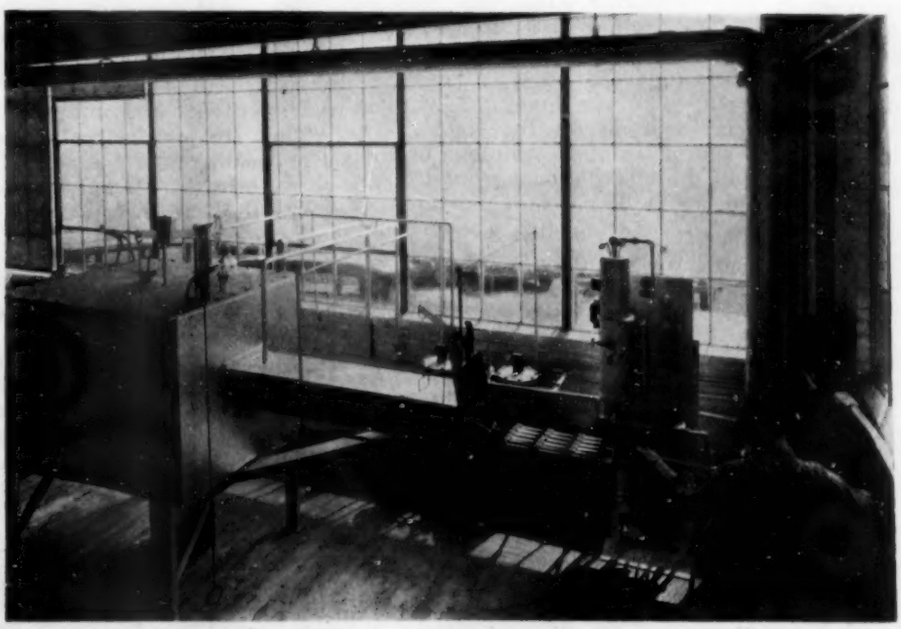
When the "tubular subtraction wheel" was fabricated by riveting, it was the source of many service complaints. Now, spotted in position and electric-furnace brazed, its strength, it is claimed, is materially increased because there are no rivets to come loose. Also service costs are cut.

Formerly, the "total link arm" was stake-pinned and torch-brazed. The driving force necessary in pinning often changed the slot dimensions. Now, the part is press-fitted and electric-furnace brazed.

The "handle hub and driving arm" assembly was formerly held together by four riveted pins which sometimes loosened and resulted in service complaints. The parts of the assembly are now press-fitted, spotted, and electric-furnace brazed.

The "handle drive shaft" assembly, previously spot-welded and torch-brazed, is now press-fitted in position and electric-furnace brazed. The vibration and severe impacts that these parts have to withstand in everyday service sometimes worked the joints loose and made replacements necessary. With the electric-furnace-brazed assembly, however, it is stated that strength is greatly improved and freedom from complaint on vibration-loosened joints realized.

The equipment used for this work consists of a General Electric controlled-atmosphere copper-brazing furnace and a G-E combustion-type furnace-atmosphere controller. The furnace, 12 inches wide and 6 inches high, has a heating chamber 38 inches long and a cooling chamber 60 inches long. It is rated at 20 kw.



G-E Electric Furnace Brazing Equipment for Calculating Machine Parts.

Palladium and Palladium Leaf

By ALAN B. THOMAS
W. H. Kemp Company, New York

A Young Precious Metal Joins an Old Industry

WITHIN the past three years, a new metal leaf has been introduced to industry—palladium leaf. Like silver and gold leaf its main uses are in arts and decoration. It is the first material available for this sort of work which combines a pure platinum-white color with non-tarnishing properties. In spite of the adverse business conditions prevailing for the past three years in the luxury trades, many applications have been developed.

Palladium leaf is 99.8 per cent pure palladium. It is produced in the sizes adopted as standard by the gold leaf industry—3⅜" x 3⅜" and 3⅜ x 3⅞". The leaf is only 1/250,000" in thickness, and one 3⅜" square weighs 1/35,000 of an ounce. It is beaten by a combination of machine and hand in New York by W. H. Kemp Company. In Paris it is produced by Buisson & Dauvet, and Charrier.

Palladium leaf is produced in the several forms that gold leaf is, and is handled in the same manner. For exterior and interior decoration the leaf is laid with sizing, but a gray or neutral colored sizing is desirable. For outdoor work, an oil sizing should be used. For indoor applications, any good sizing may be used—such as Japan gold size, gelatine and water (lettering on glass), flour and water, shellac.

Since palladium is one of the metals of the platinum group and is very similar to platinum in color and properties, it has found uses for decoration wherever a non-tarnishing white leaf was desired. One interesting application is as a background for decorative screens, where it is said that the metallic lustre gleams through the paint, giving a unique effect. The artists who are doing this work had to develop a special medium for the color, as neither oil nor water paints, in their opinion, brought out the full beauty of the metallic background.

An artist who has made palladium-covered wooden screens has begun covering his wooden pieces of sculpture with palladium leaf. His gleaming pieces have attracted a great deal of attention, and open new possibilities for this type of decorative leaf.

Another use which develops from palladium's non-tarnishing properties is for bookbinding. Since the tests made by the Employing Bookbinders' Association in October, 1934, showed that palladium leaf was resistant to acids and to tarnish, there have been a number of applications of this leaf for stamping on bindings, titling and edge-gilding.

For desk signs and picture frames, palladium leaf is either laid on wood, or stamped or tooled on leather. It is used both in hot die stamping and in hand tooling of such decorative objects as desk sets, cigarette cases, wallets, card cases, etc. Palladium is also employed for covering kid for evening purses, evening slippers, hat trimming and similar purposes.

Properties of Palladium

Palladium metal is, as has been stated, one of the platinum group. The main difference between platinum and palladium is that the latter is readily attacked by concentrated nitric acid.

Like the other platinum metals, palladium is white in color, non-fading and non-tarnishing, is workable and easily alloyed. It has a high melting point, 1,554 degrees C. or 2,829 degrees F. Its density is 12.16, which means that palladium is 20 per cent lighter than 18-karat gold, and that consequently, one ounce of palladium will make many more articles than one ounce of gold. Commercial palladium has a tensile strength of 46,900 pounds per square inch, although some of its alloys have strengths in excess of 70,000 pounds per square inch.

Palladium is found principally in the Canadian copper-nickel ores from the Sudbury, Ontario, district, and is also produced to a small extent in South Africa, Russia and South America.

Applications

The main applications for palladium, in addition to the decorative arts, are in dentistry, jewelry and electrical contacts. In dentistry, palladium is often used to replace part of the gold in dental alloys. It is also employed to improve the quality of certain precious metal dental alloys, usually combinations of platinum, palladium, gold, silver and copper. Most palladium dental alloys are white in color, and are used for such castings as full and partial dentures, cast clasps, crowns and inlays.

In jewelry, palladium is frequently used instead of white gold because of its color and its resistance to tarnish. Also, being much more easily workable than the hard white gold, it is better suited to intricate designs. Alloys of palladium with rhodium or ruthenium, which are exceptionally strong, are often employed for such work.

For electrical contacts, palladium is alloyed with other platinum metals or with silver. Palladium contacts are used in telephone relays because they always remain bright and clean, and therefore afford a sure pathway for passage of the electrical current.

Future Applications

As industry becomes more familiar with the properties of palladium, it is to be expected that its field of applications will be greatly broadened. The rarity, the beauty and the permanence of this metal make it valuable for jewelry and ornamental work, and its good conductivity, its catalytic properties and its ability to occlude hydrogen point to further use.

Electrodeposition of Tin

By A. L. SHIELDS
Materials and Process Section Engineer, Westinghouse Electric & Manufacturing Company, Springfield, Mass.

Some Experiences in Production With Semi-Automatic Equipment*

Introduction

IT IS not expected that this paper will advance any startling theories, processes or applications for the electro-deposition of tin, or discuss any extensive laboratory investigations on the subject. Its purpose is primarily to report some production experiences encountered in the operation of a semi-automatic installation where a uniform, high quality plate is required for coils, shelves and evaporators used in electric refrigerators. The operations of cleaning, plating, final finishing, and inspection are covered by detailed specifications. Several times a day pieces are selected at random immediately after plating and inspected for thickness, color and denseness of the coating. The basis metal is copper or a copper alloy, and the plated finish gives an attractive appearance, and protection against the development of discoloration that would occur if the basis metal were exposed to condensation of atmospheric moisture. A tin plate is relatively a low cost finish and is safe to use in contact with foods. Many metals in contact with food acids develop salts or other compounds which under some conditions are injurious to health. F. C. Blank of the Food Research Section of the Bureau of Commerce, Department of Agriculture, has made some extensive tests of the effect of tin and tin salts on human beings, even going so far as to feed his assistants different products containing tin. As a result, he has approved tin for use on surfaces in contact with food.

Electroplating evaporators and irregular shapes is preferred to hot tinning mostly for economic reasons. The latter method would be considerably more wasteful of tin, and would not give a uniform appearance. Electroplating insures a higher purity of tin coating than may be expected by hot dipping where certain impurities can poison the metal. There are, today, at least two types of solutions from which tin has been plated quite successfully on a commercial scale. The acid solution uses stannous sulphate, sulphuric acid, and other additions. The alkaline solution uses sodium stannate, sodium acetate, caustic soda and other additions which will be mentioned later. The Westinghouse Company is operating an acid bath at the East Pittsburgh Works, and the alkaline bath is used at the East Springfield Works. Later discussion will cover our experiences with the sodium stannate solution. Claims for the acid process are high solution efficiency, with 100% anode corrosion, and therefore low expense for solution maintenance, and a low overall cost for operation. Some reports indicate low throwing power for the acid bath, although we cannot make a positive statement on a strictly competitive basis. The plate is a good light color, with a smooth texture. Inspection of identical parts plated in each solution shows about the same quality of finish as judged on the basis of porosity and resistance to high humidity at 100°F. The sodium stannate bath provides good throwing power, and this may be a sufficient benefit for certain applications to offset some of its shortcomings. Probably the greatest single disadvantage is the lack of metal replenishing ability, especially when 20% and 30% insoluble anode area is used.

Equipment

A tank having rubber or lead lining may be used for the acid bath, while a steel tank is suitable for the alkaline solution. The major details of the equipment include a 5000 ampere, six volt generator driven by a synchronous motor. The control panel carries starting equipment and voltmeter, ammeter, and field rheostat for the plating generator. The generator is separately excited by current from a small motor generator set. The 3000 gallon plating tank is of welded steel construction. Steam coils and a temperature control and recorder are required. A conveyor which travels around the tank is mounted directly above the solution and the parts are plated during once around the conveyor. Loading and unloading are done at the same station. The cleaning operations proceed parallel with the plating tank and are completed directly opposite the loading station for plating. Tin anodes are suspended from brass bars along both sides and ends and one bar lengthwise in the middle. There are four generator leads to the outside and two leads to the inside anode bars. Individual tin anodes are supported on the conveyor to hang between evaporators as they are plated. This brings soluble anodes near the sides of evaporators to give an even plate. The cathode rack, consists of parts including three hooks for gripping an evaporator, an insulated perforated steel anode to which a flexible shunt is connected. In operation this shunt is clamped under a wing nut to a contact finger under spring pressure against the continuous anode bar. For long

* From the Monthly Review of the American Electro-Platers' Society, July, 1935.

anode support bars, several bus leads should be used. It is also advisable that current be distributed to a long cathode bus bar at several places. A bus bar which over-heated badly at contacts with two bus leads is now entirely satisfactory with four leads from the generator. Electrical contacts must be watched most carefully. This includes bus bars, drum contact fingers, anode connecting shunts, anode hooks over the support bar, and the easily overlooked contact between the Monel metal hooks and the anodes themselves. A volt meter is easily used for inspection of contact drop. The first pieces plated, particularly if they are large flat surfaces or irregular shapes, should be carefully inspected for evenness of coating. If not satisfactory the anode arrangement should be changed principally with respect to size, shape, and distance from the part to be plated.

It seems preferable to use all soluble anodes, but if this is not practical when anodes are assembled to the cathode racks, steel, nickel or corrosion resisting steel can be used. The more insoluble anode area used the greater the expense to maintain the metal content of the bath. Cast tin anodes with hooks screwed or cast in are used, but if corrosion of contact between the hook and the anode occurs, the anode will coat over with black stannous tin. If a large number is thus affected, the solution will turn dark due to lack of oxidation. For this reason some consideration is being given to ball anode holders, but the large area of iron exposed may be objectionable or possibly an advantage. The cathode rack should be insulated or designed to avoid stealing current from the work, and on high production a waste of metal.

For best control of the coating thickness on parts plated with inside anodes close to the cathode, and outside anodes some distance away, it is recommended that two generators with separate controls be used to feed current to the two sets of anodes respectively. This equipment will aid in a more even distribution of the plate and probably a more uniform color can be obtained. Shadows or discolorations are most likely to result when high current density is used with anodes close to the work. Under these conditions the plate is rough with poor light reflection.

It is well to coat the bus bars for moving contacts with a high temperature grease, as the alkali fumes will corrode and insulate the contact surface. All copper and brass bars should be heavily varnished when the equipment is installed.

Plating Conditions

Satisfactory plating can be accomplished within a wide range of the different variables. Once suitably balanced conditions are established, it is wise to maintain that balance, and the closer the better if a high rate of production is expected. The conditions to be watched most closely are:—

(a) Cleaning
(b) Bath composition
(c) Anode appearance and corrosion
(d) Anode to cathode ratio and current densities
(e) Bath temperature
(f) Plating time and thickness of deposit
(g) Rinsing

All of these considerations should receive at least daily attention, as it is much easier to keep the process under control, than to bring it back from an unbalanced condition. The operator or chemist in charge must be aware of probable consequences should any one of the set conditions vary, and either restore it to its proper value, or carefully adjust the other controllable factors to maintain balanced operations.

Cleaning before plating tin is just as important as cleaning for plating any other metal. All evaporators are heated for strain relieving which produces a light oxide coating. This film is readily loosened by a 5 to 10 minute immersion in a hot red dip solution composed of 10% sulphuric acid plus 1½ ounces of sodium dichronate per gallon. Thorough rinsing is followed by a 5 to 10 second dip in a cool bright dip acid mixture. It is essential that all traces of this acid be removed before the immersion in sodium cyanide which is followed by a cold water rinse just before plating. The basis metal and brazed joints must be free from oxide, acid, brazing flux, or carbon from the torch flame. The solution composition in use cconsists of sodium stannate 6 to 12 and sodium hydroxide 1.75—2.25 ounces per gallon respectively. If lower caustic is used the insoluble iron anodes will rust badly. Sodium acetate is present in amounts at least equal or probably double the caustic content although no recent test has been made. Carbonates exist in large amounts, with apparently no serious effect on the plating efficiency. Hydrogen peroxide is usually added when plating is started after a shut down. Production can be started with a new solution containing two ounces of sodium stannate and two ounces of sodium hydroxide per gallon. Tin concentration will increase, and free caustic will diminish. It is then necessary to analyze the bath hourly for a time to determine additions required for stabilization of operation. A new solution may also be made using 24 oz. sodium stannate, and ¼ oz. of sodium acetate per gallon.

Regardless of starting solution composition, routine analyses for metal and caustic contents should be started at once, and results plotted along with electrical data.

When uniform production is established, it is quite probable that dissolved stannate additions will regularly be required. The result will be a gradual increase of free alkali which can be controlled with additions of glacial acetic acid, diluted with about 4 parts of water. Additions should be made only as determined by chemical tests. Eventually high concentration of carbonates and acetates will occur. We have operated at a Baume gravity of 27.5 but found it difficult to dissolve stannate in this solution, the metal content dropping below 2.00 oz. per gallon. When this condition develops the metal should be plated out and the solution scrapped. The solution may be chilled slowly to about 35° F and the undesirable salts removed as crystals.

The bath composition is no doubt more easily controlled if all tin anodes are used, as insoluble anodes reduce the effective area from which tin is obtained to replenish the solution. Evaporators of an open end box type require an internal anode, and for various reasons perforated sheet steel is used. These anodes constitute about 33% of the total anode area. A typical evaporator will have 6¼ sq. ft. total area including a shelf. There is 3.75 sq. ft. on the inside and 2.46 sq. ft. on the outside surface. An evaporator plated with the internal anode disconnected gained 26.2 grams (.00024" thickness) and when plated with the anode connected the gain was 61.7 grams (.00058" thickness). Thus the insoluble anodes representing 33% of the total anode area are responsible for about 58% of the total tin deposited. A rough check from stores department records for several months consumption of sodium stannate and pure tin anodes

shows that the anodes supplied 48% of the tin deposited.

The solution temperature is quite an important consideration, and at times the thickness of plate may be controlled by changing the temperature. At a temperature of 160° F we have observed a ratio of about 12 to 14 amps per sq. ft. for each ounce of free caustic to give good soluble anode conditions. This point should be verified if possible, to establish whether any definite ratio can be expected for best results. At present, the amount of anode surface, or the number of anodes in solution is judged largely by their color. A yellow green is desired or a light gray is not objectionable. A black loosely scaled surface indicates too low a current density, or too high a caustic content. A brown color indicates the reverse of these conditions. Generally, the color of anodes can be maintained a yellow green by altering their number or surface area as required, plus control of the free caustic.

It is important that the plating time and thickness of deposit be controlled in order to guarantee production schedules, and the protective value desired for the intended service.

Rinsing the parts after plating requires sufficient removal of the plating solution to insure against staining along edges and in corners where the final draining takes place.

Summarizing the plating conditions the following specifications are set up:

Sodium stannate	6 to 12 oz. per gallon
Sodium hydroxide	1.75 to 2.25 oz. per gallon
Acetic acid	As required by analysis
Hydrogen peroxide	As required for initial oxidation
Temperature	160—170° F
Ratio Anode to Cathode Area	0.9 to 1.0
Anode Current Dens.	25 to 30 amp. sq. ft.
Cathode Current Density	20 to 25 amp. sq. ft.
E. M. F.	3.5—4.5 volts
Plating time	30 to 35 minutes
Volume of solution	3000 gallons
Insoluble anode area	66 sq. ft. of sheet steel
Soluble anode area	128 sq. ft. plus or minus
Unit capacity	60 per hour.

This paper will be concluded in an early issue.—Ed.

Status of Specifications for Electroplating on Steel

The following statement has been prepared to meet inquiries regarding the status of the specifications for plating that were recently adopted by the American Society for Testing Materials and the American Electro-Platers' Society.

Tentative specifications for plated coatings consisting of (a) nickel and/or chromium, (b) zinc and (c) cadmium on steel were prepared by a Joint Committee of the American Society for Testing Materials, American Electro-Platers' Society and the National Bureau of Standards. W. M. Phillips is chairman and W. Blum is Secretary of that Committee. These specifications were adopted by the A. S. T. M. and the A. E. S. in June, following their informal printing in the report of A. S. T. M. Committee A-5, and in the Monthly Review of the American Electro-Platers' Society for May, 1935. They have not yet been released for formal publication. Just as soon as the exact form and wording are approved by the A. S. T. M., they will be released for general printing and distribution.

The Quality Standards Committee of the Master Electro-Platers' Institute (of which M. M. Wise is chairman), was requested by the N. R. A. Code Authority for the Job Plating Industry to formulate standards for that indusry. They decided to follow the specifications then under consideration by the A. S. T. M. and A. E. S. for plating **on steel.**

In addition they found it necessary to prepare standards for plating on non-ferrous metals. As the research at the National Bureau of Standards on this subject has not been completed, tentative requirements were based on what is believed to be good practice in the plating industry. **The latter specifications are therefore distinctly temporary and subject to revision in the light of researches now in progress or of further experience.** These specifications for plating on non-ferrous metals have not been adopted by the A. S. T. M. or the A. E. S., but were adopted by the Master Electro-Platers' Institute, whose entire specifications were published in **Metal Industry** (New York) for July, 1935.

Pending the general distribution of the specifications for plating on steel in their final form, all persons connected with the plating industry are urged to become familiar with the main requirements as listed in the informal publications above referred to, so that as occasion arises they will be in a favorable position to apply these specifications in practice.

W. BLUM,
Secretary, Joint Committee on Specifications.

Tapering Tubes

Q.—We have 2,500 pieces of annealed brass tube ¾" O. D. X. .035 wall, 2½" long. We would like to have one end of these pointed thirty degrees (total angle) by about ⅛" O. D. at the small end.

We had anticipated rolling them, but would appreciate any information or advise that you can give along this line.

A.—The ideal way to produce a taper on the end of either solid or tubular stock is by use of a swaging machine. This method will not only produce tapers of any desired angle, and give any desired reduction to the size of the stock, but it may be used to produce parallel reductions.—**W. B. Francis.**

Quality Plate Pays

By M. M. WISE
President, Master Electro-Platers' Institute of the United States

How to Benefit From Quality Specifications and Quality Standards

MAXWELL M. WISE

IT IS an unquestioned fact that the motives which actuate us in business are born of self-interest. We cannot long pursue policies which fail to bring an adequate return to our enterprise.

My approach, therefore, to the problem of quality specifications and standards in the job plating industry raises the question of the benefits which will accrue to the individual shop through promotion of Quality Plate. Again I am dealing with the subject largely from the standpoint of production platers on ferrous metals, the field in which I have had the most experience.

First, how will a shop benefit from quality plate? Second, how will it affect a shop's profits? Third, how can a shop do quality work?

These questions and the answers which I am giving do not exhaust the subject. It is my conviction, however, that there is a good answer to every criticism of quality plate.

Quality Will Save the Plating Business

How will a shop benefit from quality plate? If I read aright present day trends, shops will either produce quality work or find themselves in time entirely shut out either by the encroachment of substitute lines upon the plating processes, or by the increase in the number of manufacturers plating departments, or by the capacity increase of those competing shops which have been wise enough to establish themselves in the trade as quality operators. In short, therefore, platers will benefit from quality work by saving their businesses. That should be answer enough.

Quality Will Increase Profits

How will quality plating affect the job shops' profits? I have proven to my own satisfaction that it will increase those profits.

In the first place, quality plate will increase the volume of one's business. The shop which does quality work soon develops a quality reputation among its customers. It becomes a preferred source even at a higher price, should the additional price be necessary. The shop whose service is increasingly in demand and quotations are respected by the trade is in a most favorable position to secure an adequate return or profit for such services.

Quality standards strictly adhered to improve shop practices and morale. The employees develop a quality complex. The spectres of operation costs and of rejection expense begin to fade at an amazing rate. The plant runs more smoothly. The owner has more time to devote to developing his business contacts and enlarging the scope of his services.

I say, rather positively, that quality plating, and by that I mean plates of approximately .001", will not increase net costs. There will be naturally an increased metal cost and an increased power cost to plate it. Due to the better coverage of the thicker plate one may be able to reduce one's polishing cost somewhat. Buffing cost may and probably will increase, but plating labor will not increase. Grant an increase of 5% in certain operating costs on a given job. This will be more than offset by the saving in rejections, both in your shop and by your customer, efficiency in production, and in increased volume.

The repair plater who cannot depend upon increased volume or the adoption of production methods to lower his costs, or the die-casting plater who has his peculiar problems in securing adequate plate, depends for quality workmanship upon the sanction of satisfying the customer. Where higher prices are necessary good salesmanship will convince the customer. In these cases also increased patronage will ultimately result, all other things being equal. More business at right prices will be the reward of the quality repair or die-cast plater.

In general it is safe to say that quality services will tend to decrease a shop's net costs for the reasons enumerated above. The practice of giving quality strengthens the competitive position of the business. The fear that the additional cost of doing quality work will place the owner at a competitive disadvantage is contradicted by experience and fact. Usually we

find that the failure of a shop which is endeavoring to do quality work is traceable to some other causes such as failure of the owners to keep up the changes taking place in the industry, changes in processes, in equipment or in demand; failure to maintain sufficient records of costs or to use such records intelligently; failure to maintain an adequate organization, cases where the owner attempts to do too many things himself, lacks aggressiveness, has inefficient associates, or other similar causes which may be classed as mismanagement.

Plant Conditions Must Be Right!

How can a shop do quality work; gain a reputation as a quality shop and make it pay? As intimated above, all the principles of good management are involved in any successful business enterprise. But quality workmanship, policies and standards have their earmarks.

When an experienced manufacturer or his agent enters a plant to inspect it, the first thing he looks at is not the tanks, generators or lathes (they will get a good looking over) but the walls, ceilings, windows and floors. Is the plant orderly and clean? Are the windows washed? Can a man walk through the plating room without stumbling over kegs or boxes? Is the shop full of partly finished work pushed off into corners, covered with dust?

Conditions in the plant must be right. The psychological effect of a dirty shop upon employees leads to poor workmanship. Are the anode and cathode rods on tanks clean? They **must** be to produce quality work. Are the generators clean? **Most important** of all, are the solutions clean? Dirty solutions cause more poor nickel plate than all other bad conditions combined. The manufacturer's agent will ask what current density is used. Are the tanks equipped with ammeters? Have they been tested so that the operator knows they are right?

In plating to thickness specifications, voltmeters are useful only in indicating how one's generators are operating. The ammeter is the vital piece of equipment. A plater cannot know what he is doing unless his ammeter is functioning properly. Tank rheostats should be avoided if possible. When they are necessary they should be kept clean and in working order.

As far as solutions are concerned, good plating can be done over a very wide range and no attempt has ever been made to specify analysis or other plating conditions. As long as one's equipment is in proper shape, and the solutions are clean, good plating can be produced at from 10 to 200 amperes per square foot from 80° to 160° F., with or without agitation, and solution densities from 16 to 45 oz. of nickel sulphate per gallon.

The thickness of plate is a function of current density, time of plate and efficiency of the solution. At an efficiency of approximately 95% it will require 1,300 ampere-minutes to plate 0.001" of nickel so that the time required to plate depends entirely upon the current density at which the particular solution will operate satisfactorily.

Check Solutions Regularly

If a shop is not large enough to afford a chemist, the owner should make arrangements with a commercial laboratory for frequent analysis of his solutions. The day of guesswork in electroplating is past. The chemist is in the driver's seat. The sooner we realize it and leave the directing of the technical processes to thoroughly trained men, concentrating our efforts to enlarging our services, improving our business methods, and enhancing our reputation as quality operators, the better off we will be.

Quality Plating Is Here

What we do in the next few years will make or break the job plating industry. The Master Electro-Platers' Institute and its affiliated branches are committed to the promotion of quality plating. In its membership and the membership of the affiliated local branches will be found the large majority of progressive job platers who are coordinating their efforts toward maintaining a reliable, complete and efficient electroplating service for the metal trades and the public at large.

Soft Soldering

Q.—We are having trouble with soft soldering of Britannia metal borders on nickel silver or copper, silver plated trays finished in what is commonly termed a bright butler or brushed finish.

A roughness or pin holes around the inside edge of the soldered bead permits traces of the plating solutions to remain and cause a white spotting out after the articles are all finished.

We have taken extra care in cleaning the surface of the article before soldering, and have tested our acid flux, feeling assured that this is alright, so we wonder if our metal solder mixture is causing the trouble.

A.—As you did not state the composition of your Britannia, we cannot recommend composition of the solder, except perhaps 2 tin—1 lead.

Your trouble with soft soldering of Britannia metal borders on nickel, silver or copper, and silver plating the trays which are finished in what is termed a bright Butler or brushed surface, may be caused by the solder.

Where there are roughness and pin holes around the inside edge of the soldered beads, there are open crevices between the solder and the body metals, these being known sometimes as cold shuts. The cleaning acid and other solutions will penetrate these crevices, and cannot be washed out thoroughly. Therefore, a white spotting out after the articles are finished, will result.

The solder is probably oxidized, or dirty, so that it is not liquid enough to contact the nickel, silver or copper. Possibly the solder has too much lead, as some batches do. Add more tin. Be sure that the body metals are actually clean and that the use of flux is restricted. Too much flux can be worse than too little. If the trouble is not remedied properly, send some samples for microscopic examination.

—W. B. Francis.

Permanent Metal Products Exhibit Opens In New York

THE first section of the Metal Products Exhibit—the first permanent exhibition of metals and plastics in this country—opened its doors to visitors on September 16, in the International Building, Rockefeller Center, New York. This exhibition, which is under the direction of Metal Products Exhibits, Inc., is designed to provide a comprehensive review of metallic and plastic materials and parts as used by industry.

Features at the opening of the Exhibit include a display of "Metals in the Modern Manner", by a group of industrial designers, an exhibition showing metal finishing in all its phases and a comprehensive display of modern plastics as parts and finished products. The entire third floor of the International Building, comprising 16,000 square feet of floor space, has been reserved for exhibition purposes, but only a part of this space is at present ready for occupancy.

Noteworthy items in the exhibition of modern industrial design include: cocktail set, tea set, and folding tray by C. J. Ackerman; trestle table by Buoy, Inc.; tables by Donald Deskey; alarm clocks, and kitchen utensils by Henry Dreyfuss; console table by Frank W. Grats; refrigerator, washing machine, and coffee set by Lurelle Guild; ash stand and coffee table by Allan Gould; door knob and switch plate by Gustav Jensen; lamp, salt and pepper, and penholder by William Lescaze; occasional table, cocktail shaker, and coffee set by Paul A. Lobel; electric locomotive model, refrigerator, and cosmetic compact by Raymond Loewy; clocks, water cooler, and reflector lamp by Gilbert Rohde; oil heater, gas range, and sales slip register by Walter Dorwin Teague; coffee set, punch set, and smoking set by Russel Wright; chafing dish, book ends, and cigarette box by Walter Von Nessen.

Metal Finishing Exhibit

The Exhibition of Modern Metal Finishes, which was assembled under the direction of Adolph Bregman, Managing Editor of **Metal Industry,** includes numerous examples of straight polishing, electro-plating, chemical coloring, rustproofing, lacquering and enameling, and vitreous enameling.

The old time prospectors for gold had a saying, "You can't see into rock". The same idea brought up-to-date is equally true of metal products—"You can't see under the surface"—and the only thing visible on the surface is the finish.

The purpose of a finish may be either or both of the following:

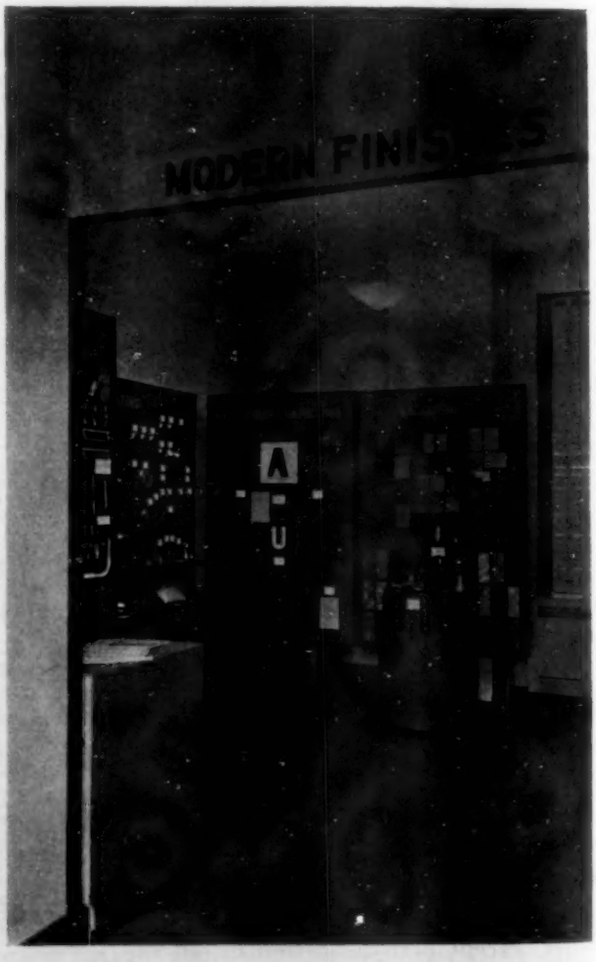
1. To protect the base metal from corrosion. "Save the Surface and You Save All".
2. To beautify the article. "It is the Finish that Makes the Sale".

Only in the last few years has the realization of the importance of this part of metal products manufacturing come home to executives. And now they are often bewildered, among the myriad finishes possible, when faced by the question, "What finish shall we use?"

Metal Finishes Available

Metal finishes group themselves into the following classes:

1. Straight polishing.
2. Electroplating.
3. Chemical coloring.
4. Hot dipping.
5. Metal spraying.
6. Vapor coating.
7. Lacquering and enameling.
8. Vitreous enameling.



A Display of Modern Metal Finishes at Metal Products Exhibits, Which Opened September 16 at the International Building, Rockefeller Center, New York.

To exhibit a full line of samples of each type of work would require half the International Building, as some of these classes have a multitude of varieties. Unfortunately, the only space available is one room. However, in this room will be found examples of the most important decorative and protective finishes of the above classes. Among them are metal products and parts finished in chromium plate, nickel plate, bright nickel plate (which requires no buffing), nickel which has been deposited in a tumbling barrel, copper, brass, bronze, zinc, cadmium and tin.

Precious metals are among the most important elements used to beautify and protect articles of commerce. Silver will be in evidence, of course, as will also gold. In addition, there will be samples of platinum, and last a newcomer—a rare metal but one with a bright commercial future—rhodium plate.

Another interesting member of the family is plating on non-metallics, such as glass, plaster, plastics, etc.

The chemical finishes will include colors on aluminum which have recently come into popularity. There are also found a wide variety of chemical or "cold dip" colors on solid or plated metals. Silver, for example, can be turned out in Butler finish, French gray, matte, etc. Copper and brass can be turned out with all sorts of colors, brown, green, patina, verde antique, blue-black, Tiffany old English, etc. Gold has a wide variety of appearances including rose gold, green gold, Rogers gold and others.

One industry in this group which has made extraordinarily rapid strides is the lacquer and lacquer enamel group. The varieties of appearance possible by the use of lacquers is almost infinite, but a large number will be found which will give a good idea of the range of choice available to the manufacturer of metal products.

One or two special exhibits are of unusual interest. One group will show the Story of Metal Finishing. Starting from the base metal, which may be either a newly fabricated product or an old part which calls for re-finishing, samples will be shown of the work in various stages, step by step through to the finished and marketable or usable part. This collection will give the layman an idea of the various operations required and the care necessary in putting a suitable finish on a raw piece.

Another exhibit which has a real story to tell is an explanation of Specification Plating. Samples will be shown of good plate and bad plate immediately after plating. Both look alike. Then there are samples of the good plate and bad plate some time after the piece has been put into use, showing clearly how the good plate stands up, retaining its beauty while the bad plate becomes rusty or scaled as the case may be. The moral of this story is that plating should be done to specification. A good plate calls for a certain metal thickness and the purchaser, whether he be a manufacturer or the ultimate consumer, should know what the plate consists of.

The firms chosen to co-operate in this exhibit are representative of the most progressive thought in their field. Among them are numbered: **Weisberg & Greenwald,** 71 W. 45 St., New York; **Pyrene Manufacturing Company,** Newark, N. J.; **The Udylite Company,** Detroit, Mich.; **Grasselli Chemical Company,** Cleveland, Ohio; **International Silver Company,** Meriden, Conn.; **Philip Sievering, Inc.,** 199 Lafayette Street, New York; **Egyptian Lacquer Manufacturing Company,** 90 West Street, New York; **Maas and Waldstein Company,** Newark, N. J.; **Zapon Company,** Stamford, Conn.; **Lucius Pitkin, Inc.,** 47 Fulton St., New York; **Aluminum Company of America,** Pittsburgh, Pa.; **Parker Rustproof Company,** Detroit, Mich.; **Hanson-Van Winkle-Munning Company,** Matawan, N. J.; **Roxalin Flexible Lacquer Company,** 35-40 36 St., Long Island City, N. Y.; **Agate Lacquer Manufacturing Company,** 11-13 43rd Road, Long Island City, N. Y.; **Lea Manufacturing Company,** Waterbury, Conn.; **Morris Sanders,** 219 E. 49 St., New York; **Vitreous Enamel & Stamping Company,** 1381 Sedgewick Ave., New York.

The puzzled manufacturer and user of metal products can emerge from his dilemma by viewing directly the variety types of work applicable to his product. There is nothing like seeing before deciding!

Rolling Lubricant

Q.—We manufacture iron-lined tubing and in the process of rolling, we use oil, as a lubricant. Although the seam on the brass fits very tightly over the iron tube we find that, in plating, enough oil comes out from between the seams to affect the cleanliness of the surface.

Thus we have our nickel peeling off along the seam —due to the surface not being chemically clean and, when we plate the tubes in a copper solution the streaks caused by the oil are very apparent.

Can you suggest a lubricant for rolling these tubes that will not seep out from the seams when we plate the tubes?

A.—We know of no lubricant of practical application that will not seep out between seams when an excess amount of the lubricant lies between the iron pipe and the brass covering, and is subjected to pressure, either in the working or by expansion of the iron pipe in the plating process.

While not familiar with the type of forming machine you are using, a microscopic film of oil should be sufficient. In an older practice where brazed brass tubes were drawn over an iron pipe and through a die, a severe operation, a dip made of tallow and yellow soap and water were used; 60 lbs. tallow, 15 lbs. yellow soap, dissolved in hot water should make about 100 gallons.—**W. J. Pettis.**

EDITORIALS

Palmer Hall Langdon

FIFTY-ONE years ago, Palmer Hall Langdon, a boy of sixteen, secured his first job as an apprentice in the Rhode Island Locomotive Works, at six cents an hour. For eight years he worked in one shop after another, gaining experience, and attending classes at night. He saved a few hundred dollars, came to New York, went into the tile manufacturing business—and lost it all. He then turned to newspaper work and became a reporter on one of the large dailies, continuing to read and study in his spare time.

Two years later this young man joined in a new venture in trade journalism, The Aluminum World, which he later purchased. After eight years, when a man of thirty-four, he founded The **Metal Industry.** It was a small, struggling journal but built upon the bedrock of soundness, honesty and accuracy Under his wise guidance, it has become **Metal Industry** as we know it to-day—the leading journal of the non-ferrous metal manufacturing and metal finishing industries.

Mr. Langdon was a self-made man. He started at the bottom and rose to the top. He was in the main, self-taught, but still he was able to make an indelible imprint on the industries in which he was engaged and which he served. His business success was due to his high principles and determination to give to each reader and advertiser, full value. His interests were broad. He was vitally concerned with the humanities. He was a member and supporter of a large number of civic societies as well as business and professional organizations. His sympathies were deep. He lived not only for himself alone, but for his family, his friends and his associates. He had a unique personality, a characteristic and original way of expressing himself. His kindliness, his strong convictions and his sturdy character commanded general affection and respect.

We, the staff of **Metal Industry,** mourn our loss.

Business Improves

BUSINESS activity has continued to improve during September extending the trend of the last two months. According to the National Industrial Conference Board greater than seasonal increases have occurred in construction, steam and electric power. Machine tool orders rose very little in August but remained three times greater than a year ago. Although the index for residential building contracts declined, this loss was more than offset by a rise in non-residential construction. A partial explanation of this condition and some hope for the balance of the year is embodied in the fact that farm income for 1935 will be higher than in any year since 1930, according to the estimates of the Bureau of Agricultural Economics.

Two good sized "straws" which show the way the wind is blowing are the announcements of General Motors and United States Steel that they will spend $50,000,000 and $140,000,000 respectively on new plant and machinery in the near future. When industry plans definitely to lay out such capital sums, we know that times are on the mend.

There are still bad spots. Export trade at the present time is only one-third as great as it was just before the depression. Another great laggard is railroad purchasing; a third is building construction which, though rising, is still far below reasonable totals.

Checking these general summaries with our own industry, we find general improvement also in the brass manufacturing industry, the foundry equipment line, scientific instruments and in machinery for the manufacture of small metal parts. Foundry equipment shows an astonishing rise but this is undoubtedly the result of extraordinarily poor business last year.

There are still many clouds in the sky, but it is clearing.

Plating Research Continues

RESEARCH in electroplating which has done so much for the industry in the past few years, is continuing at full speed. The report of the work at the National Bureau of Standards, read by Dr. Blum at the recent Bridgeport convention of the American Electro-Platers' Society, summarizes the present status, and the plans for the future. This work as we know, is being financed by the American Electro-Platers' Society, and is being carried on with the co-operation of the American Society for Testing Materials. Manufacturers of metals and plating supplies have donated the principal materials required. As Dr. Blum stated, "This project is a good example of cordial co-operation."

The recently published specifications for nickel, chromium, zinc and cadmium on steel were the result of a two-year testing program. In addition, methods of testing were worked out, such as the dropping method for cadmium, proposed by Clark in England, and modified by Hull in the United States. (See The Monthly Review of the American Electro-Platers' Society for March 1935, and **Metal Industry** for April 1935). Similar methods to determine the local thickness of chromium coatings are still being worked out, and will be reported upon as soon as satisfactory results are obtained.

A new program of exposure tests is now being prepared. A total of 6000 specimens of base metals, cold rolled steel, hot rolled steel, gray iron, rolled copper, cast, extruded and rolled brass, rolled and cast nickel brass, rolled zinc and zinc base die castings, will be tested after plating. It is hoped that the plating can be finished and the exposure tests started early in 1936. As soon as the exposure tests are started, laboratory studies will be made upon methods of testing and specifying plated coatings on non-ferrous metals.

Dr. Blum states that the continued co-operation of

the American Electro-Platers' Society will facilitate the progress on this program. There is no doubt that he will get it.

The Plater and His Assistant

AT THE 23rd Annual Convention of the American Electro-Platers' Society, recently held in Bridgeport, the following amendment to the constitution was passed.

"Assistant foremen platers shall be admitted as associate members when they qualify with 5 years' experience in plating, one year of which they have had as assistant foremen; providing such application is presented or endorsed by the foreman plater under whom the assistant foreman is employed. Such an associate member shall automatically become an active member when he becomes a foreman plater".

By this action, the American Electro-Platers' Society took a long step forward as an organization. It was not only a generous act; it was far-sighted and wise.

It was generous because it extended a helping hand to the young men in the industry, giving them the opportunity of educating themselves by contact with older men and experts. It was far-sighted because it provided for a steady stream of new members, young blood, coming into the Society. No organization can live long without youth coming in to replace those who pass on.

The American Electro-Platers' Society has undertaken a membership drive with a local committee from each branch in direct charge. We heartily endorse this project and urge all our readers in the plating industry who are not yet members, to join the Society. Full information can be obtained from Joseph E. Underwood, Chairman of the Membership Committee, 327 North Tenth Street, Camden, N. J.

Nickel and the United States

A VERY interesting and enlightening summary of the nickel situation with respect to the United States appeared in the September issue of the Engineering & Mining Journal. The article was contributed by George W. Pawel, a metallurgist of many years' experience in the nickel field.

Mr. Pawel shows that while nickel is not a huge tonnage metal compared to some of the other common metals, it yields to none of them from the standpoint of diversity and importance of its applications, although this fact is not appreciated by the general public. The common impression is that the main outlets for the metal are in armament, coinage and electroplating, but actually they absorb only a very minor proportion of the total production. Its usefulness as the pure metal or as alloy, either ferrous or non-ferrous, extends into every field and serves varied and numerous purposes, both peace and war-time. All branches of industry, transportation, communication, building construction, and the home consume nickel in one form or another.

The author further points out that the United States normally absorbs well over half the world's nickel output. Moreover, practically the entire amount of our 40,000 tons of annual requirement is imported. Hence nickel is classed, with tin, chromium, manganese and others, as one of our "deficient" metals, subject to study by the President's Special Planning Committee, chosen for the purpose of determining upon a mineral policy for the nation.

The article alludes interestingly to the early mining history of the country, especially the workings of Pennsylvania, Connecticut and Missouri during the years when the United States was a prominent figure in nickel production. The Alaskan deposits are also favorably mentioned as Mr. Pawel is personally familiar with this area and apparently believes that it holds the most promise for the revival of the American nickel industry.

Reference is also made to the several nickel refineries which at one time flourished in the country, employing hundreds of American workmen and accounting for the bulk of the world's production. These plants, one after the other, folded up their tents and departed to other lands, leaving us at the present time with no primary refining capacity whatsoever.

The author is led to inquire, "Might not some of the old prospects be opened and an incentive given to developing new ones if the country afforded a custom refinery for handling such ores?" His intimation is strong that with a very promising nucleus in the Alaskan field and several known deposits in other states of the Union, with an assured market and many American workmen eager for employment, the possibilities for an American nickel industry are not so remote. Mr. Pawel has presented an interesting subject seemingly well deserving of the serious consideration he asks.

Sanity for Silver

A GUST of fresh air has blown into the stuffy chamber in which silver has long been perspiring. Francis H. Brownell, chairman of the board of the American Smelting and Refining Company, in a recent address delivered before the American Mining Congress has given us some authoritative words which are, to say the least, refreshing.

He points out that the fundamental purpose of Congress is to further, in the long run, the utilization of silver as a monetary metal reserve, rather than merely to have the Secretary of the Treasury buy silver as rapidly as possible until the ratio of 1 to 3 is established and then stop regardless of consequences. A purchasing policy that will afford a steady price for world mine production of silver is best, both for the mines and for the countries in which they are situated.

Mr. Brownell gives figures to bear out his contention that the price of silver should be held between 60 and 65 cents in the open market. He is in favor, however, of paying the present rate of 77 cents per ounce for newly mined American silver, in order to increase employment in the mining industry, at the same time allowing the Government an excellent profit, since the coinage value of silver is $1.29. He feels that the present tendency is increasingly toward a greater use of silver for monetary purposes, and that the long run future of silver is brighter and more promising to-day than at any time in the last five years.

Mr. Brownell's predictions will be heard with respect; also with the hope that the Treasury will agree with his policy of a steady market at a reasonable price, which will be a boon to the manufacturer and consumer of silver products.

Technical Publications

Factors Influencing the Formation and Structure of Hot-dipped Tin Coatings, by E. J. Daniels. International Tin Research and Development Council, 149 Broadway, New York.

Chromite. By Gordon H. Chambers. Foote-Prints. June 1935. Published by Foote Mineral Company, Philadelphia.

Atmospheric-Exposure Tests on Nonferrous Screen Wire Cloth. Technical News Bulletin, National Bureau of Standards, Washington, D. C. June 1935.

Alloys for Basic Types of Ingot Metals. Technical News Bulletin, National Bureau of Standards, Washington, D. C. June 1935.

Mechanism of Chromium Deposition from the Chromic Acid Bath. Technical News Bulletin, National Bureau of Standards, Washington, D. C. June 1935.

Separation of the Six Platinum Metals from One Another and Their Gravimetric Determination. Technical News Bulletin, National Bureau of Standards, Washington, D. C. June 1935.

What the Government is Doing About Apprenticeship. By W. F. Patterson, American Foundrymen's Association, 222 W. Adams Street, Chicago, Ill.

Standards of Four Year Foundry Apprenticeship. American Foundrymen's Association, 222 W. Adams Street, Chicago.

Standard Tables for Chromel-Alumel Thermocouples. Research Paper RP767. National Bureau of Standards, Washington, D. C.

Methods of Testing Thermocouples and Thermocouple Materials. Research Paper RP768. National Bureau of Standards, Washington, D. C.

Thermal Expansion of Monocrystalline and Polycrystalline Antimony, by Peter Hidnert. Research Paper RP 784. National Bureau of Standards, Washington, D. C.

Relation of Grain Size to Condition of Aluminum-Alloy Propeller Blades. Technical News Bulletin. National Bureau of Standards, Washington, D. C., July, 1935.

Preparation of Large Single Crystals of Copper. Technical News Bulletin of the National Bureau of Standards, Washington, D. C.

Black Chromium Plating by A. Pollack. Chemiker-Zeitung, Vol. 59, January 16, 1935, p. 56. The author describes a method of obtaining a black chromium deposit. He uses 80 to 100 amperes per square decimeter; maximum temperature, 15 degrees C.; chromic acid content, 250 to 400 grams per litre, using acetic acid or other organic acid instead of sulphuric. Voltage 11 to 14. Solution must be cooled to keep it within the 15 degrees C. maximum. The black chromium plate is said to be extremely hard.

Brass and Bronze Alloys for Welding. Printed in Flashes, a publication of the Thomson-Gibb Electric Welding Company, Lynn, Mass.

One hundred per cent copper is poor in weldability; brass containing 95% copper and 5 zinc is also difficult to weld. Increasing the zinc content improves the weldability of the alloy so that the 80-20 alloy is fairly good for this purpose and the higher zinc brasses are even better. Copper 95, tin 5 gives fair results; copper 90, tin 10 is good, and copper 85, tin 15 welds very well.

Atmospheric Exposure Tests on Nonferrous Screen Wire Cloth, by G. Willard Quick. Research Paper RP 803. National Bureau of Standards, Washington, D. C.

Mechanism of Chromium Deposition from the Chromic Acid Bath, by Charles Kasper. Research Paper RP797, National Bureau of Standards, Washington, D. C.

The Use of Sodium Sulphite as an Addition to Alkaline Detergents for Tinned Ware, by R. Kerr. Technical publication of the International Tin Research and Development Council, 149 Broadway, New York, Series A No. 19.

The Twinning of Single Crystals of Tin, by Bruce Chalmers. Technical publication of the International Tin Research and Development Council, 149 Broadway, New York, Series A-20.

Black Spots on Tin and Tinned Ware, by Sven Brennert. Technical publication of International Tin Research and Development Council, 149 Broadway, New York, Series D No. 2.

Book Notes

Metal Industry Handbook and Directory. Published by Louis Cassier Company, Ltd., 22 Henrietta Street, London, W. C. 2, England. A paper bound annual handbook and directory. Size 6 x 9, 470 pages.

Institute of Metals Division Transactions for 1934. Published by American Institute of Mining and Metallurgical Engineers, 29 West 39th Street, New York. Size 6 x 9, 379 pages. Includes the papers on non-ferrous metals presented at the Detroit meeting, October 4-5, 1933 and the New York meetings, February 19-22, and October 2-4, 1934. Price $5.00.

Handbook of Cast Metals. Published by American Foundrymen's Association, 222 W. Adams Street, Chicago, Ill. Size 6 x 9, 500 pages. $4.00.

This book, which has just been published, is divided into six sections, covering castings of all sorts: cast iron, malleable iron, cast steel and non-ferrous metals, from the standpoint of the designer of castings, the buyer of castings and the producer of castings. A more extended review will be published in an early issue.

Year Book American Metal Statistics for 1934. 50th annual issue. Size 8½ x 10½, 112 pages. Price $2.00. Published by the American Bureau of Metal Statistics, 33 Rector Street, New York. This annual volume is the standard source of information on the statistics of metal production and consumption.

Discoveries — New and Old

To the Editor of The **Metal Industry**:

In your May issue on page 173, in the editorial headed "Discoveries—New and Old," you refer to the publication of the use of arsenic in a brass solution in 1930.

This was published in "Galvanoplastic Manipulations" by A. A. Fesquet (translation of A. Roseleur), 1872, page 103.

This may not have been available to the English investigators, but how about the most excellent treatise, "Electroplating" by Barclay and Hainsworth, 1912, page 102, published by Edward Arnold, London, England?

E. E.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

METALLURGICAL, FOUNDRY, ROLLING MILL, MECHANICAL, ELECTRO-PLATING, POLISHING, AND METAL FINISHING

H. M. ST. JOHN W. J. PETTIS W. J. REARDON W. B. FRANCIS
G. BYRON HOGABOOM T. H. CHAMBERLAIN WALTER FRAINE

Barrel Nickel

Q.—In a separate package there is a sample of tumble nickel solution. Kindly analyze, and oblige.

A.—Analysis:

Metallic nickel	6.47 oz./gal.
Ammonium chloride	1.45 oz./gal.
pH	6.3

For a cold solution it is too low in chloride. Add 1.5 ounces per gallon of ammonium chloride and 3 fluid ounces per 100 gallons of concentrated sulfuric acid.

For a hot solution add 4.25 oz. nickel chloride per gallon if high purity anodes are used. If 95-98% anodes are used, add 1.25 oz. nickel chloride per gallon. This will make the nickel content slightly high, and therefore no more nickel salts should be added until the nickel content is reduced to 6.5 oz. The solution can be operated at 100° F. It will be found that for room temperature, 4 oz. of metal give best results.

G. B. H., Jr., Problem 5,424.

Black on Steel and Aluminum

Q.—I am taking advantage of your Shop Problem page and am submitting these two questions for answer:

1. Practical method for bluing or even blackening iron or steel such as rifles and guns.

2. Method for blackening aluminum, non-electrolytic preferred. I find the usual formula does not do the trick:

White arsenic	1 oz.
Iron sulphate	1 oz.
Hydrochloric acid	12 oz.
Water	12 oz.

A.—A gun metal blue may be treated in a nitre bath. This bath is made up of heating equal parts of sodium and potassium nitrate in a cast iron or steel pot to 600-1,000 deg. F. and manganese added in the ratio of about 1 part oxide to 50 parts nitre. Mixing pot should be free from rust and dirt.

The articles to be blued are first cleaned, then given a thin coating of oil, then immersed in the hot nitre at 600 deg. F.—650 deg. F. Leave articles in bath till they reach desired color. Rinse in cold water, then boiling hot water and finally in hot oil. A darker gun metal blue may be obtained by heating to 1,000 deg. F.

A black or gun metal finish may be obtained on steel articles by heating them in a retort with a small amount of charred bone and heated to 700 deg. F.—800 deg. F. After articles are thoroughly oxidized temperature is dropped to 650 deg. F. and a mixture of bone and carbonia oil is added. Several hours are required to produce finish. Articles after coming from retort are rolled in oily granulated cork until uniform black finish is secured.

The following solution will give to aluminum a uniform black color:

Water	1 litre
Potassium permanganate	5-10 grams
Nitric acid 28 deg. Be	2-4 cc
Copper nitrate	20-25 grams

Temperature, 80 deg. C.

Time to obtain deep black, 20 to 30 minutes.

T. H. C., Problem 5,425.

Buffing Stainless Steel

Q.—We have been asked for buffing and polishing machine with 8" diameter muslin buff wheels, and which with only a rouge coating will be used for buffing stainless steel.

We would appreciate if you will tell us as to what speed these 8" wheels should operate, or what surface speed in feet per minute is most generally used for this class of work, regardless of the diameter of the buff wheel.

A.—In buffing stainless steel with only a rouge coating it is necessary to have metallic surface free from oxide, scale and a comparatively smooth surface.

A surface speed of at least 9,000 ft. per minute is required, regardless of diameter of buff. A sewed buff should be used with either a heavy cutting chrome rouge or a chrome coloring rouge as a coloring medium.

T. H. C., Problem 5,426.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: ..... **Employed by:** .....

Kind of solution: ..... **Volume used:** .....

Tank length: ..... **width:** ..... **Solution depth:** .....

Anode surface, sq. ft.: ..... **Cathode surface, sq. ft.:** .....

Distance between anode and cathode: ..... **Kind of anodes:** .....

Class of work being plated: ..... **Original formula of solution:** .....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible. Use separate sheet if necessary.

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

Cadmium on Die Castings

Q.—I need a little advice on the following: Cadmium on die casting satin finish, also strip for same on rejected pieces.

A.—Scratch brush raw die casting wet or if rough, polish first. Articles are then cadmium plated and given either a dry or wet scratch brush for desired finish. Lacquer to protect finish. Satisfactory deposits may be obtained from following solution:

Sodium cyanide	7 oz./gal.
Cadmium oxide	3 oz./gal.
Potassium hydroxide	2 oz./gal.
Temperature	113 deg. F.
Current density	10-25 amp. per sq. ft.

Any patented brightener may be used. Strip, 10% Ammonium nitrate. (Patent situation involved).

T. H. C., Problem 5,427.

Coloring Steel Blades

Q.—We have a problem in production of razor blades which is giving us a great deal of difficulty, pertaining to the coloring of the steel.

The samples enclosed will show you the variation in coloring that we require and if you have any suggestions or any other articles which you think would be of assistance to us in solving our manufacturing problem, we would appreciate your advising us accordingly.

A.—The ordinary method used to obtain a blue finish on tempered razor blade steel is as follows:

After steel has been hardened and drawn it is necessary to polish and then heat to 550 deg. F.—600 deg. F. This temperature does not effect temper.

It is absolutely necessary to have a clean surface in order to obtain a uniform color. Some trouble may be experienced in uniformly coloring a domestic grade razor blade steel. If such is the case it is suggested to use Swedish base steel.

A steel color such as submitted is obtained by polishing after drawing or tempering.

T. C. H., Problem 5,428.

Electro-Zincing Pipe

Q.—As subscribers to the **Metal Industry,** we would appreciate your comments on the following problem: We are at present electro-galvanizing conduit pipe for the electrical trade by using a racking-up method with an electric overhead hoist. We find that this constitutes too much handling and we contemplate installing continuous motion equipment.

We intend to scratch brush the pipe after pickling. These pipes will not immediately drop into the plating tank. We are therefore somewhat worried as to whether they will oxidize or become scummy while immersed in water. Would it be practical to have these pipes drop into a copper sulphate dip, while waiting for the plating process? By practical, we mean, is plating zinc over a copper-dipped surface, good practice? Will it peel?

A.—If chlorinated or artesian well water is being used a scum will form on the pipe. To prevent this the water may be acidulated with hydrochloric acid, up to not over 1% by volume. The work must be well rinsed before plating.

It is not good practice to plate zinc over a copper dipped surface. The adhesion of the copper is not good and there will be electrolysis. There is no necessity for the copper dip since as we have stated above, oxidation will not set in immediately.

G. B. H., Jr., Problem 5,429.

Silver Deposit

Q.—To use either one of the following solutions at a temperature of 75° F., with a cathode current density of four to five amps per square foot, ¾ to 1 volt, what time would be required to deposit eight to twelve dwt. of silver on article (example, 8 oz. coffee pot)?

No. 1 Solutions	
Silver cyanide	3½ oz.
Sodium cyanide	5 oz.
Sodium carbonate	2 oz.
Water	1 gallon
No. 2	
Silver chloride	3½ oz.
Sodium cyanide	8 oz.
Sodium carbonate	2 oz.
Water	1 gallon

Any information relative to above question will be appreciated.

A.—The cathode efficiency in a cyanide silver solution may be taken to be 99% to 100%. That is, from 99% to 100% of the current passed through the solution is utilized in the deposition of metal on the cathode.

The following figures apply to silver:

Specific gravity	10.53
Weight, in ozs. per sq. ft. per .001" of thickness	.79 troy ounces
Ozs. deposited per 100 amp. hrs.	12.9 troy ounces
Inches deposited per 100 amp. hrs. per sq. ft.	.0163 inches.
Amp. hrs. per sq. ft. to deposit .001"	6.2 ampere hours

From these figures it can be seen that 5 amperes per square foot flowing for one hour will deposit one twentieth of 12.9 troy ounces, per sq. ft. of cathode surface (.645 oz.) or, one-twentieth of .0163 inches of thickness (.000815").

To deposit 8 Dwt. of silver on a square foot of surface will require 3.1 ampere hours, or at a C.D. of 5 amps per sq. ft., .62 hrs. which is 37 minutes.

To deposit 12 Dwt. per sq. ft. requires 56 minutes.

These figures assume 100% current efficiency.

It will be necessary to calculate the area of the work you are handling. Also, remember that the silver will not deposit uniformly over the entire surface and to obtain a certain thickness of metal on one spot may require much more on another.

G. B. H., Jr., Problem 5,430.

Silver on Stainless Steel

Q.—I would appreciate the formula for the solution used to silver-plate stainless steel.

A.—In silver plating stainless steel it is essential to etch slightly the surface with an acid pickle. This is done to obtain a metallic surface that the subsequent electro-deposit of silver will adhere to.

A pickle made up of 10%—15% sulphuric acid, either electrolytic or still, at a temperature of 150 deg. to 160 deg. F., will work satisfactorily.

A silver plating bath of the following composition can be used:

Silver cyanide	4.00 troy oz./gal.
Sodium cyanide	5.00 oz./gal.
Free cyanide	4.00 oz./gal.
Water	1 gallon

T. H. C., Problem 5,431.

Yellow Brass Deposit

Q.—We wish a yellow brass. Solution gives trouble. After a few loads, the voltage creeps up and the deposit comes out red in the center and yellow around the edge.

A.—Analysis:

Metallic copper	3.05 oz./gal.
Metallic zinc	0.49 oz./gal.
Free sod. cyanide	0.87 oz./gal.
Sodium carbonate	2.54 oz./gal.

The zinc content and free cyanide are too low. Add ½ oz./gal. zinc cyanide and 1 oz./gal. sodium cyanide. Add to the solution ammonia in small amounts until the desired color is obtained. The total amount of ammonia should not exceed 1 pint per 100 gallons of solution.—G. B. H., Jr., Problem 5,432.

Patents

A Review of Current United States Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,988,422. January 15, 1935. **Brazing Alloy.** Wilbur B. Miller, Flushing, N. Y., assignor to Oxweld Acetylene Company, a corporation of West Virginia.

1,988,439. January 22, 1935. **Strip Metal Winding Block.** James R. Coe, Watertown, Conn., assignor to The American Brass Company, Waterbury, Conn.

1,988,504. January 22, 1935. **Cadmium Base Bearing Metal.** William E. McCullough, Detroit, Mich., assignor to Bohn Aluminum & Brass Corporation, Detroit, Mich.

1,988,506. January 22, 1935. **Die-Casting Machine.** Charles Pack, Jackson Heights, N. Y.

1,988,645. January 22, 1935. **Method of Preparing and Plating an Aluminum Object.** William H. Bowden, Newton, Iowa, assignor to The Maytag Company, Newton, Iowa.

1,988,823. January 22, 1935. **Rust Remover.** Carl Winning and John Tuttle, Elizabeth, N. J., assignors to Stanco Incorporated, a corporation of Delaware.

1,988,929. January 22, 1935. **Metallurgical Furnace Gas and Method of Controlling Composition.** Frederick P. Wilson, Jr., Schenectady, N. Y., assignor to General Electric Company, a corporation of New York.

1,988,938. January 22, 1935. **Copper Alloy.** Michael George Corson, Jackson Heights, N. Y., assignor of three-twentieths to George H. Corey, Bayside, N. Y.

1,989,242. January 29, 1935. **Method of Working Aluminum.** Henry D. Monsch, Grantwood, N. J., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,989,301. January 29, 1935. **Pickling Basket.** Stephen L. Williams, Bridgeport, Ohio, assignor to Extruded Metal Products Company, Bridgeport, Ohio.

1,989,308. January 29, 1935. **Zinc Alloy.** William Waite Broughton, Hohokus, N. J., and George L. Werley, Palmerton, Pa., assignors to The New Jersey Zinc Company, New York, N. Y.

1,989,456. January 29, 1935. **Flux for the Smelting and Refining of Magnesium and Magnesium Alloys.** Alexander Luschenowsky, Berlin, Germany.

1,989,557. January 29, 1935. **Soldering Flux.** Richard E. Muller, Berlin-Wilmersdorf, Germany, assignor to Kuppers Metallwerke, Gesellschaft m. b. H., Bonn, Germany, a company of Germany.

1,989,764. February 5, 1935. **Process and Composition for the Production of Reflecting Surfaces.** Max Meltsner, New York, N. Y.

1,989,765. February 5, 1935. **Sodium Meta Silicate Detergent.** Henry V. Moss, St. Louis, Mo., and Foster Dee Snell, Brooklyn, N. Y., assignors to Swann Research, Inc., a corporation of Alabama.

1,989,812. February 5, 1935. **Apparatus for Die Casting.** William M. Lester, Shaker Heights, Ohio.

1,989,852. February 5, 1935. **Method of Sweating Out Fusible Metals.** William F. Eppensteiner, Rahway, N. J., assignor to The American Metal Company, Limited, New York.

1,990,070. February 5, 1935. **Bimetallic Article.** Herbert W. Graham and Samuel L. Case, Pittsburgh, Pa., assignors to Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

1,990,075. February 5, 1935. **Core and Mold Wash.** Julius J. Horak, San Francisco, Calif., assignor to Quandt Chemical Co., San Francisco, Calif.

1,990,168. February 5, 1935. **Heat Treatment of Alloys.** Michael G. Corson, Jackson Heights, N. Y., assignor to Electro Metallurgical Company, a corporation of West Virginia.

1,990,273. February 5, 1935. **Soldering Flux.** Harry B. Dykstra, Wilmington, Del., assignor by mesne assignments, to The Grasselli Chemical Company, Cleveland, Ohio.

1,990,277. February 5, 1935. **Metals of the Platinum Group and Certain Alloys.** Otto Feussner and Alfred Jedele, Hanon-on-the-Main, Germany.

1,990,314. February 5, 1935. **Welding Refractory Metal.** Rudolf Wildermann, New York, N. Y.

1,991,162. February 12, 1935. **Process for Improving Copper-Titanium Alloys.** Wilhelm Kroll, Luxemburg, Luxemburg, assignor to Metal & Thermit Corporation, Carteret, N. J.

1,991,300. February 12, 1935. **Process of Producing Protective Coatings on Metal Surfaces.** Gustav Tichy and Heinrich Klas, Dusseldorf, Germany.

1,991,395. February 19, 1935. **Process of Treating Metal.** Cyril Kocour, Chicago, Ill.

1,991,527. February 19, 1935. **Crinkled Coated Surface.** Karel Toll, Passaic, N. J., assignor, by mesne assignments, to Chadeloid Chemical Company, New York, N. Y.

1,991,528. February 19, 1935. **Crinkled Surface Coating.** Karel Toll, Passaic, N. J., assignor, by mesne assignments, to Chadeloid Chemical Company, New York.

1,991,533. February 19, 1935. **Lacquer for Brush Application and Process of Making the Same.** William Courtney Wilson and Charles Elliott Fawkes, Chicago, Ill., assignors to Pyroxylin Products, Incorporated, Chicago, Ill.

1,991,539. February 19, 1935. **Method of Making Plastic Bronze Bearings.** Alfred L. Boegehold, Detroit, Mich., assignor to Gen. Motors Corp., Detroit.

1,991,747. February 19, 1935. **Electroplating Sequence.** George B. Hogaboom, New Britain, Conn., assignor to Hanson-Van Winkle-Munning Company, Matawan, N. J.

1,991,817. February 19, 1935. **Method of Plating Steel.** John S. Nachtman, Warren, Ohio.

1,991,893. February 19, 1935. **Metallic Packing.** Zeno E. Flick, Jackson, Mich., and Jacob R. Price, Kansas City, Mo.

1,991,912. February 19, 1935. **Sintered Hard Metallic Alloy.** Karl Schroter, Berlin-Lichtenberg, and Hans Wolff, Berlin, Germany, assignors to Fried. Krupp Aktiengesellschaft, Essen-on-the-Ruhr, Germany.

1,991,994. February 19, 1935. **Method of Plating Iron with Aluminum and Product of Such Method.** Anton Wimmer, Dortmund, Germany.

1,991,995. February 19, 1935. **Platinum Metal Ammino Cyanide Plating Bath and Process for Electrodeposition of Platinum Metal Therefrom.** Edmund M. Wise, Westfield, N. J., assignor to The International Nickel Company, Inc., New York.

1,992,045. February 19, 1935. **Phosphoric Acid Metal Cleaning and Rust Preventing Solution.** William K. Schweitzer, East Cleveland, Ohio, assignor to The Grasselli Chemical Company, Cleveland, Ohio.

1,992,118. February 19, 1935. **Manufacture of Alloys Containing Copper and Zinc.** Henry Winder, Brownsdon, Moseley, Birmingham, Maurice Cook, Newport Pagnall, and Herbert John Miller, Fellings Park, Wolverhampton, England, assignors to Imperial Chemical Industries Limited, a corporation of Great Britain.

1,992,204. February 26, 1935. **Method of Treating Magnesium.** John A. Gann and William H. Gross, Midland, Mich., assignors to The Dow Chemical Company, Midland, Mich.

1,992,205. February 26, 1935. **Method for Treating Magnesium Articles.** John A. Gann and William H. Gross, Midland, Mich., assignors to The Dow Chemical Company, Midland, Mich.

1,992,325. February 26, 1935. **Process of Normalizing Ternary and Multiple Alloys Forming Solid Solutions.** Carl Schaarwachter, Altena-Westphalia, Germany, assignor to Vereinigte Deutsche Metallwerke Aktiengesellschaft Zweigniederlassung Basse & Selve, Altena-Westphalia, Germany, a corporation of Germany.

1,992,372. February 26, 1935. **Hard Metal Alloy.** Julius Holzberger, Dachau, near Munich, Germany, assignor, by mesne assignments, to Gebr. Bohler & Co., Aktiengesellschaft, Berlin, Germany.

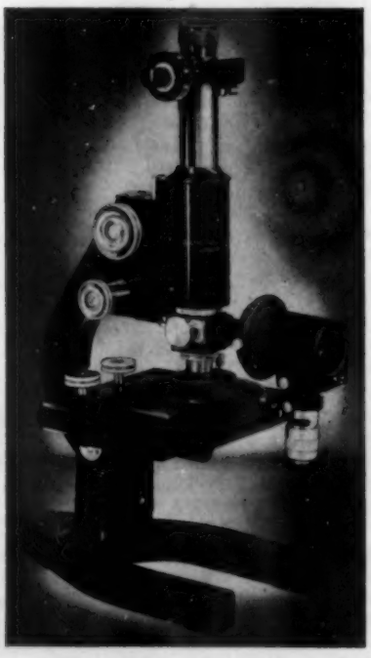
Equipment

New and Useful Devices, Metals, Machinery and Supplies

Electroplaters' Microscope

Exclusive distribution of the Bausch and Lomb Electroplaters' Microscope in the electroplating industry has been taken over by Hanson-Van Winkle-Munning Company, Matawan, N. J.

Inexpensive, simple and rugged in construction and easy to operate, this microscope, it is said, makes it possible for the plater to determine the exact thickness of the plate at any desired place. It is thus possible to rack work



Electroplaters' Microscope

in such a way as to secure a more even plate and to materially reduce rejects and the attending stripping and replating operations.

The instrument, which magnifies to such an extent that a plate 1/100 of an inch thick appears to be four inches thick, consists of a monocular microscope stand (H type) equipped with both coarse and fine adjustments, an achromatic objective, a Filar micrometer eyepiece, a vertical illuminating unit for lighting the specimen and a mechanical stage to facilitate locating the specimen in the field of the optical system.

Thickness is measured by adjusting the eyepiece by means of the drum on the side until the cross line lies over one boundary of the plate. Note the reading on the drum. Then by turning the drum the cross line is moved to the other boundary. The number of divisions through which the drum has been moved gives the thickness of the film directly in units of .00001".

Specimens are prepared for measuring as in the metallographic laboratory.

Core Plates and Pallets

Advantages which may be gained by foundrymen and by the ceramic and abrasive industries through the use of J-M Transite core plates and pallets have just been set forth in a new booklet published by Johns-Manville, 22 East 40th Street, New York.

J-M Transite core plates are made from flat sheets of asbestos and portland cement combined under great pressure and then specially treated with a series of impregnations and bakings. They are said to be economical because they are permanently non-corrodible (easier to clean), show little if any warpage after long service, and do not break or crack when dropped as easily as do plates commonly used. A very important consideration is that Transite core plates are lighter than steel or iron plates and a core maker can carry twice as many Transite plates with less effort.

J-M Transite pallets for the ceramic and abrasive industries are identical in composition with Transite core plates and are said to be of special value in this type of work, not only because of their strength and resistance to warpage but because their smooth surface and low water absorption allow the ware to creep freely as it shrinks in the drying process.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Electric Tumbelmixers. For the mixing of dry or liquid solutions in a chemical stoneware barrel, which is airtight, preventing evaporation and consequently aeration or foam. U. S. Stoneware Company, 50 Church St., New York.

New Potentiometer Pyrometer—wide-strip pyrometer, which is available in single-record, multiple-record and recorder-controller types. The Bristol Company, Waterbury, Conn.

New Electrical Attachment Plug; with corrugated spring action, making good firm contacts. Patent Sales Promotion Company, 530 Canal Street, New York.

Triple Life. A surface coating for paint, varnish, lacquer, etc., on metal which can be applied by the spray gun, soft cloth or lamb's wool applicator; to prevent oxidation. Franklin Research Company, 5134 Lancaster Avenue, Philadelphia, Pa.

Electromode Electric Unit Heater. Models include industrial type unit for suspension from ceilings, wall brackets, etc. for semi-portability around industrial plants. Electric Air Heater Company, Division of American Foundry Equipment Company, Mishawaka, Ind.

Safety Bench Power Press. For light assembling, riveting and foot press work; designed to reduce danger and fatigue. Waterbury Farrel Foundry and Machine Company, Waterbury, Conn.

Optical Instruments. A group of instruments which will be exhibited at the National Metal Congress by the Bausch and Lomb Optical Company, Rochester, N. Y. They will include a new Ortho-Stereo camera and stereoscope; a new electroplater's microscope; a new grain size measuring eyepiece, particularly designed for Bausch and Lomb metalloscope; or similar equipment; a new Ampliplan eyepiece producing exceptional flatness of field for use in photomicrography.

Electric Thickness Gauge; for measuring the thickness of porcelain enamel, paint or other non-magnetic materials on flat sheets or plates of steel or iron. General Electric Company, Schenectady, N. Y.

Plating, Cleaning and Finishing Materials. "Hi-Lustre" for producing mirrorlike finish; "Visibol" for boiling off and cleaning; "Spekleen", electrolytic cleaner; rhodium phosphate solution; yellow gold solution; "Spekwite", a brilliant white plating solution. Special Chemicals Corporation, 30 Irving Place, New York.

Humidified Buffs. Udylite Company, Detroit, Mich.

New Electrical Resistance Alloy, with operating temperature of better than 2460 deg. F. C. O. Jelliff Manufacturing Corporation, Southport, Conn.

Pickling Process Uses Alternating Current

The Ferrolite pickling method developed by the Ferro Enamel Corporation, Cleveland, Ohio, is a chemical process, stimulated in reaction time by the use of alternating current, rather than a process solely dependent on electro-chemical reaction for its efficiency. Also it is a process designed for adaptation to bulk pickling rather than to the individual piece racking methods heretofore used by electro-picklers.

The Ferrolite electrolyte is composed of an inorganic and an organic acid, the former serving as a carrier for the current and also as a source of attack upon the iron. The latter serves as an agent to dissolve the lower oxides of the metal and as a regeneration catalyst for the reproduction of the inorganic acid in the bath.

Today, a sulphuric acid pickling bath is discarded when the iron—present as ferrous sulphate—reaches the point where the pickling rate slows down appreciably. Large quantities of free acid are still present but must be lost to maintain a normal production schedule. With the Ferrolite pickling method, it is stated that the ferrous sulphate is oxidized to ferric sulphate and this combines with the normal salt of gluconic acid, ferrous gluconate, to form ferri-gluconic acid, which has an iron content of approximately 19.6%. This permits the sulphate ion to combine with the hydrogen present and form sulphuric acid.

Three distinct benefits are claimed for this organic-inorganic reaction: (1) longer life of the pickling solution, due to the destruction of the ferrous and ferric sulphate present; (2) lower acid cost, due to the regeneration of sulphuric acid in the tank; (3) a better finish obtained more rapidly on the pickled metal, due to the breakdown of bonding oxides underlying the Fe_2O_3 as they combine with the free organic acid to form ferrous gluconate.

New Palladium Plating Solution

A new palladium plating solution has been developed by Pre-Metals, Inc., 120 Wall Street, New York, which it is stated, has unusual advantages, and makes it possible to plate palladium in a practical commercial manner at reasonable cost. The solution is recommended for flash coatings of cheap articles and also for the heavy plating, if desired, to obtain a non-tarnishable plate comparable in durability with high-grade silver plate.

Some of the characteristics of the solution are as follows:

Temperatures, from 50 degrees F. to boiling.

Current density, from 0.01 to 1 amp. per sq. in.

Metal content, from 0.5 to 4 ozs. Troy per gallon.

Anodes, insoluble, such as graphite, palladium, platinum, etc.

Tank, glass, stoneware, enameled metal or pitch lined.

The articles may be still plated or agitated. The composition of the bath must be maintained by the addition of concentrated solution or salts, the amounts to be determined by analysis. The preparation of the work is the same as for any other type of plating, the main requirement being absolute cleanliness of the base.

The palladium deposit is recommended for resistance to food products, fruit acids, etc., and industrial and public uses, such as reflectors of all types, jewelry, etc. Tests by independent laboratories, it is stated, have shown that the deposit has good resistance to tarnish.

New Laboratory Stirrer

The stirrer shown in the illustration is a sturdy, well built accessory most useful for making emulsions, dissolving dyes, gums and resins, waxes and bitumens, pyroxylin, celluose ethers, casein, glue, gelatin, starch, salts; extracting crude drugs and herbs, oil seeds, complex organic materials, etc.

Actuated by a shaded pole type motor (110V. 60 cycle) it will, it is claimed, run 24 hours daily without damage; it is non-sparking and will not be injured by fumes and vapors. The speed may be varied as needed by the rheostat. It fits an ordinary clamp holder or may be screwed to a shelf or wall. The shaft and propeller are furnished in chromium plate or Monel. A flexible, 6 foot rubber covered cord and soft rubber plug are included.

It is sold by the Chemical Publishing Company of New York, 175 Fifth Avenue.

Laboratory Stirrer

THE NEW PLANT OF HANDY & HARMAN IN TORONTO, CANADA

Brass Die Casting Alloy

Doehler Die Casting Company, Toledo, Ohio, announce a new brass die casting alloy under the trade name "Doler-Brass".

This new alloy, containing copper, zinc and silicon, is especially adapted to the die casting process and is said to give a fine finish when cast. Its physical properties are the following:

Tensile Strength	65,000-75,000 lbs. sq. in.
Yield Point	30,000-40,000 lbs. sq. in.
Elongation	20-25% in 2"
Reduction Area	20-25%
Brinell Hardness	110-120 (500 Kg.)
Impact Strength	30-36 ft. lbs.
Color	Light Yellow

The addition of "Doler-Brass" to its other trade marked alloys "Brastil" and "Doler-Niklbrass", both previously announced, bring a wide range of copper base alloys in die cast form to the designing engineer.

White Plating Solution

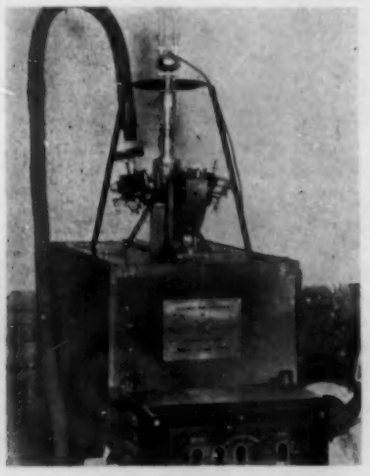
The Special Chemicals Corporation, 30 Irving Place, New York City, is offering a solution to deposit a brilliant white plate ("triple alloy") which requires no buffing. This plate has been named Spekwite.

To one gallon of water, add two ounces sodium cyanide and two ounces of Spekwite. Heat to boiling and cool. Use iron or carbon anodes; voltage 4 to 9; temperature 150°—180° F.

Full instructions are supplied.

New X-Ray Equipment

The St. John X-Ray Service, Inc., 30-20 Thomson Avenue, Long Island City, N. Y., have installed in their laboratory the most up-to-date x-ray equipment for diffraction analysis. Instead of the old-fashioned gas tube which had to be operated on a vacuum pump, they are using new research tubes with molybdenum, copper and cobalt targets. Specially designed instruments and cameras enable them to undertake any kind of x-ray diffraction investigation.



St. John X-Ray Equipment

Catalogs

Besly Titan Steelbacs. For use on disc grinders; new Bakelite resinoid bonded abrasive discs. Charles H. Besly and Company, 118 N. Clinton Street, Chicago, Ill. (431)

Thwing's Foundry Visitor. Interesting journeys to interesting foundries. A house organ of the Thwing Instrument Company, 3339 Lancaster Avenue, Philadelphia, Pa. (432)

Condor V-Belts. Facts on their construction. Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc., Passaic, N. J. (433)

Welding Light Gauge Metal; with the new low cost 75 ampere arc welder. The Hobart Brothers Company, Box DM 343, Troy, Ohio. (434)

Handbook of Goodrich Industrial Tires. B. F. Goodrich Company, Akron, Ohio. (435)

How the Dollar Was Undermined or Price Stabilization by the Federal Reserve System. By E. S. Pillsbury, Century Electric Company, St. Louis, Mo. (436)

Simplified Arc Welding and Its Many Uses. Hobart Brothers Company, Box EW 49, Troy, Ohio. (437)

My Visit to the AC Factories. A Souvenir booklet. AC Spark Plug Company, Flint, Mich. (438)

Lost Art or New Art? A description of Mallory 3 metal, an alloy consisting predominantly of copper with the co-efficient of resistivity; co-efficient of expansion, modulus of elasticity and corrosion resistance of pure copper, electrical conductivity ranges from 75 to 85 per cent of copper. P. R. Mallory and Company, Inc., Indianapolis, Ind. (439)

Duo Metals. A form of cladding metals by a new system. Latrobe Electric Steel Company, 40 W. 40th Street, New York City. (440)

Selecting a Plan for Compensating Salesmen. Policyholders Service Bureau, Metropolitan Life Insurance Company, 1 Madison Avenue, New York. (441)

The Benefactions of Andrew Carnegie, by Burton J. Hendrick. Carnegie Corporation of New York, 522 Fifth Avenue, New York. (442)

Compensated Belt Construction. Bulletin 6808-B explaining the details of the Condor Compensated Belt. Manhattan Rubber Manufacturing Division of Raybestos-Manhattan, Inc., Passaic, N. J. (443)

Automatic Plating and Processing Equipment. A combined exposition of several types of Meaker equipment together with their applications, to assist manufacturers in selecting the type best suited to their special needs. The Meaker Company, 1629 S. 55th Avenue, Chicago, Ill. (444)

Industrial Products. Insulation, packings, refractories, roofing and siding, flooring, friction materials, electrical materials, Transite pipe. Johns-Manville, 22 E. 40th Street, New York. (445)

Small Laboratory Furnaces. Bulletin No. 9 describing two new Ajax-Northrup electric furnaces and a new discharge gap. Ajax Electrothermic Corporation, Ajax Park, Trenton, N. J. (446)

Permite Six-Foot Cast Bronze Bars. Valuable data on physical properties such as wear resistance, coefficient of friction, machineability, tensile strength, etc. Joseph T. Ryerson and Son, Inc., Chicago, Ill. (447)

Filters for Electroplating Solutions. T. Shriver and Company, Harrison, N. J. (448)

Nickel in the Brass Foundry. A series of bulletins issued by International Nickel Company, 67 Wall Street, New York, on various phases of this subject: Use of Nickel in Non-Ferrous Castings, No. 301.

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. METAL INDUSTRY will see that you get them promptly.

METAL INDUSTRY
116 John Street, New York.

(Insert below the number in parentheses at end of each item desired.)

I wish to receive the following catalogs mentioned in October, 1935

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Name ....Address .....

Some Effects of Nickel on Bronze Foundry Mixtures, No. 302.

Brief Outline Covering Improved Physical Properties of Nickel Containing Bronzes. No. 303.

Casting Properties of Nickel Bronzes. No. 401.

Foundry Practice for Nickel Silver. No. 402.

Molding Sand Characteristics for Nickel Bronzes, Nickel Silvers and Monel Metal. No. 403.

Strength and Aging Characteristics of the Nickel Bronzes. No. 501.

Physical and Casting Properties of the Nickel Silvers. No. 502.

A Method for Study of Shrinkage and Its Distribution in Castings. No. 503.

Several of these bulletins are reprints of papers read before the American Foundrymen's Association. The whole collection is of great value and should be on the shelf of every foundryman and foundry metallurgist. (449)

The Metal Cleaning Handbook, by Dr. R. W. Mitchell, Magnus Chemical Company, Garwood, N. J. Equipment, methods and materials with practical suggestions for their use; a ready reference and guide; 216 pages, 370 illustrations. The book also covers coolants and cutting lubricants. A limited number free to concerns interested in these subjects. To others, $1. (450)

Associations and Societies

Electrochemical Society

Headquarters, Columbia University, New York

Among the papers which will be read at the October meeting in Washington, D. C., are the following:

Studies in the Theory of Chromium Electrodeposition, by R. R. Rogers, Columbia University.

Sodium Discharge Potential at the Mercury Cathode, by W. W. Stender, M. M. Stroganov and P. B. Zivotinsky of Leningrad, Russia.

On Palladium-Hydrogen, by Wm. Krause and L. Kahlenberg, University of Wisconsin.

Electrodeposition of Tin and Its Alloys, by L. E. Stout and A. Erspamer, Washington University, St. Louis.

Conditions Governing the Formation of Highly Insulating Anodic Layers on Aluminum, by J. E. Lilienfeld, J. K. Nieh and S. Goldman of Ergon Research Laboratories, Malden, Mass.

Errors in Corrosion Research, by R. B. Mears and H. E. Daniels, Cambridge, England.

Concentrated Copper Cyanide Plating Baths, by L. C. Pan, Shanghai, China.

On the Simultaneous Discharge of Nickel and Hydrogen Ions from Solutions of Simple Nickel Salts, by O. Essin and E. Alfimowa of Sverdlovsk, U. S. S. R.

Inorganic Addition Agents in the Nickel Plating Solution, by R. Harr, University of Wisconsin.

Abstracts of these papers will appear in our November issue.

Newark Branch, A. E. S.

c/o George Reuter, 784 Prospect Street, Maplewood, N. J.

The Newark Branch of the American Electro-Platers' Society held its annual clambake and outing on Saturday, September 21st, at the Old Cider Mill Grove, Vauxhall Road, Union City, N. J.

Over a hundred members, guests and ladies attended this affair, at which as usual, every one had a most enjoyable time. Newark Branch affairs are always like that!

Bridgeport Branch, A.E.S.

c/o W. H. Flaherty, 691 Maplewood Ave.

The annual outing of the Bridgeport Branch of the American Electro-Platers' Society was held on September 7th at Milford, Conn., at the Jockey Club.

The outing was attended by all of the members of the branch and their wives, and also a large number of guests. Lunch was served at 12 and dinner at 5:30 and the assemblage enjoyed a very entertaining day.

Copper and Brass Warehouse Distributors Association

Cornelius Lauritzen, secretary of the Copper and Brass Warehouse Distributors Association has announced the opening of offices at 420 Lexington Avenue, New York. This association will administer a trade agreement reached at a special meeting held on September 11th.

National Safety Council

20 N. Wacker Drive, Chicago, Ill.

The 24th Annual Safety Congress and Exposition will be held in Louisville, Ky., October 14-18.

Full details can be obtained from the headquarters of the Council.

Manufacturers Association of Connecticut

The Annual Meeting of the Manufacturers Association of Connecticut, was held October 2, at which time the formal election of officers took place. The following were elected for the coming year:

President, **E. Kent Hubbard,** Middletown, Conn.

Vice-president, **John H. Goss,** Scovill Manufacturing Company, Waterbury, Conn.

Treasurer, **C. L. Campbell,** Connecticut Light and Power Company.

Director-at-Large, **Frederick Keller,** Seth Thomas Clock Company.

International Acetylene Association

30 East 42nd Street, New York

The International Acetylene Association will hold its 36th annual convention this year in Cleveland at the Cleveland Hotel on November 12th, 13th, 14th and 15th, according to an announcement just issued by the Association's Secretary, H. F. Reinhard.

Speakers at the technical sessions will include prominent men in many fields of commerce and industry. New developments in the oxy-acetylene process, and their application to industrial problems will be discussed by leading welding engineers.

Additional details and copies of the tentative program may be obtained from the Association's Headquarters.

Personals

Henry L. Zucker

It is seldom that any man has the distinction of serving one industry continuously for 50 years. For such a distinction, however, the Hanson-Van Winkle-Munning Company takes great pleasure in honoring its Vice President, Henry L. Zucker, who for the past 50 years, or beginning with the 22nd day of October, 1885, has been continuously employed in the manufacture, designing and processing of plating and polishing compounds for the metal plating and all other industries employing abrasives for polishing and cleaning purposes. Mr. Zucker furthermore has the unique distinction of carrying on the original work founded by his father in the year 1860, for it was in that year that his father, George Zucker, began the manufacture of polishing rouge in America in a steam kettle in his home.

Seventy-five years ago rouges were commercially unknown in America, and when George Zucker began to manufacture them they were made in small quantities and distributed among various jewelry supply houses and technical industries, such as gold, silver and allied trades, microscope and lens industries, etc. From a small beginning, the George Zucker Company, which was organized in 1862 and which was the first commercial firm devoted exclusively to the manufacture of rouges and compositions in America, was successful and was awarded the gold medal for rouges and compositions at the United States Centennial Exposition of 1876 in Philadelphia.

Not content with rouges and compositions, Mr. Zucker, with the cooperation of his sons, branched out in the manufacture of tripoli and lime compositions, and from their experiments the famous "Acme Lime" was brought into being. This lime was the first successful commercial attempt to manufacture a substitute for the crocus and rouges used for the polishing of plated nickel. It commands as high respect after a period of 40 years as when first put upon the market, and is sold today exactly as made from the original formula in 1892. This lime made possible the sale of high lustre, nickel plated bicycles, which were so much in vogue in that period, and really revolutionized the buffing of nickel

HENRY L. ZUCKER

beginning with that period. Other products were added from time to time, such as compositions for the rubber industry, celluloid industry, Bakelite industry, etc., all of which helped to enhance the reputation of Mr. Zucker's concern.

In 1916 the George Zucker Company was merged with A. P. Munning & Company, which in turn became the present Hanson-Van Winkle-Munning Company in 1927. During all of these years Henry L. Zucker has given constant and careful attention to all of the progress and the new developments which have taken place in the polishing and finishing abrasive divisions of the electroplating and allied industries.

Mr. Zucker's genial disposition, his wide knowledge and experience in this particular field, and his many improvements and inventions in buffs and compositions, places him in the foremost rank of polishing experts, and his Company is very proud to acknowledge the value of the services which he has rendered not only to them but to the entire industry. In fact, during Mr. Zucker's reign as Vice President of the Metal Finishers' Equipment Association, he was constantly consulted and gave of his knowledge freely to any competitors who wished to have information concerning not only the history but the trend of development in his particular field.

Mr. Zucker has been continuously, since 1916, the Vice President in charge of production of polishing and plating compositions for A. P. Munning & Company and the Hanson-Van Winkle-Munning Company. It is earnestly hoped that he will continue to be so for many years to come, to the advantage of not only themselves, but of the customers and the trade in general. He has with him one son, Harry, to whom he has been imparting the knowledge of this business so that his good work can carry on.

The Hanson-Van Winkle-Munning Company is arranging to mark the 50th Anniversary of Mr. Zucker's entry into this business and to wish him continued good luck, Godspeed and more of the happiness which he has had in seeing his products used throughout the world. He has made every one of his friends and associates a little better for his having lived with and among them.

Gold Medal Awarded to George Zucker Company at the U. S. Centennial Exposition of 1876, in Philadelphia, Pa., for Rouges and Compositions.

George Gehling

George Gehling, who has been for years, one of the leading figures in the American Electro-Platers' Society has joined the forces of the Frederick Gumm Chemical Company, Union City, N. J.

GEORGE GEHLING

On July 10th, 1935, Mr. Gehling celebrated fifty-one years of active service in the electroplating industry. He started his career in the dip shop of the Charles Radcliffe Sons button shop on July 10, 1884. The following years were spent in gaining experience in plating everything from steam locomotives down to small toilet pins, and among the shops in which he worked were the following: Rogers Locomotive Works, Paterson, N. J.; Ballwood Engine Works, Elizabeth, N. J.; Westinghouse Electric and Manufacturing Company, Newark, N. J.; Sargent Saddlery Hardware Company, Newark, N. J. and Universal Caster and Foundry Company, Newark. In 1916, Mr. Gehling went to Philadelphia and worked with the Miller Lock Company of that city. He has rounded out his fifty-one years with fifteen years at the Delong Hook and Eye Company of Philadelphia.

Mr. Gehling was president of the Philadelphia Branch of the A. E. S., for eight years. He was secretary-treasurer of the National Society for four years and president of the National Society for one year. He is now an Honorary Member of the Philadelphia Branch. He has been a delegate to the A. E. S. conventions for fifteen years.

Mr. Gehling has hundreds of friends throughout the industry who wish him the best of fortune in his new post.

O. B. Mueller, president of the Mueller Brass Company, Port Huron, Mich., has announced that he will dissolve his interests in the company and retire from active business within the next two years.

Obituaries

George William Dover

George William Dover, one of the pioneers of the manufacturers of jewelers' findings, and inventor of a number of inventions in the findings industry, died suddenly September 21 at the home of his son with whom he made his home, in the Edgewood district of Providence, R. I. He was in his 71st year. He is survived by three sons, a daughter and five grandchildren.

For the past five years he has devoted himself largely to the interests of the Drapery Hardward Manufacturing Company, Providence, of which he was the vice president. He was widely known throughout the jewelry industry of this country and Canada, and during the heyday of the industry about the beginning of the present century, the factory consumed more than 150 tons of brass alone annually, although the firm's products included all metals.

Mr. Dover was one of the first to own an automobile in Providence, previously having been an ardent bicyclist and as a member of the old Rhode Island Wheelmen, the winner of numerous track prizes. He was a member of the Pomham Club, West Side Club, Edgewood Yacht Club; was a past dictator of Providence Lodge of Elks and member of the Loyal Order of Moose. He was for many years actively identified with the New England Manufacturing Jewelers' and Silversmiths' Association, the Manufacturing Jewelers' Board of Trade, the National Jewelers' Association, the National Metal Trades Association, the National Jewelers' Board of Trade, the Jewelers' Findings Manufacturers' Association and the old-time Jewelers' Club of Providence and an honorary member of the New York Jewelers' Club.—M.

Philip Billingham

Philip Billingham, founder and owner of the Billingham Brass and Machine Co., Trenton, N. J., for the last 51 years, died September 11 in his 81st year. He had been in failing health for the past two years.

Born in Staffordshire, England, Mr. Billingham came to Trenton in his late 'teens as a skilled chain maker. For a number of years he conducted a chain business, during which time he obtained a patent in a mechanical meat cutter which was put into use in all parts of the world. He later established a brass shop and foundry which he conducted in latter years with his son Thomas.

Mr. Billingham is survived by his widow, a son and four daughters, a brother and one sister. Burial was in Trenton.—C. A. L.

Ralph H. Garrison

Ralph H. Garrison, sales manager of the Marble Card Electric Company, Gladstone, Mich., died on Sunday, August 18, at the age of 43. He had been associated with his company for three years.

John S. Neagle

John S. Neagle, purchasing agent of Chase Companies, Waterbury, Conn., died in his home in Watertown on September 6th, of heart failure. He was in his 72nd year and had spent his entire business career with the Chase Company starting in the purchasing department 51 years ago. In recent years, in addition to purchasing the various metals used by the companies, he also looked after some of their real estate and insurance affairs. He is survived by a widow, two daughters and a son, James.

Leonard M. Allen

Leonard M. Allen, assistant treasurer and credit manager of the Bridgeport Brass Company, died suddenly September 6th in his 66th year. He had been with the company since 1900, starting in the credit department. He was known throughout the trade as a prominent credit official as he had traveled from coast to coast for many years in the service of the company. He is survived by a wife and two daughters.

Robert A. Regester

Robert A. Regester, formerly manager of J. Regester Sons, Company, Baltimore, Md., manufacturers of brass work, died recently at his home, 613 E. 34th Street, Baltimore, Md. He was 84 years old.

Mr. Regester was the son of Joshua and Hester Jones Regester. He received his education in the public schools and at Newton Academy. Following the cessation of the foundry business, Mr. Regester engaged in other business activities, retiring about ten years ago.

Surviving him are his widow, three sons, three grandchildren and three great-grandchildren.

Charles Fell

Charles Fell, for 20 years general manager of the Lorain, Ohio, plant of the National Tube Company, died on August 28, at the age of 70. His first employment with the company was as a blacksmith's helper at the McKeesport, Pa., works. Even this minor position he worked up through various departments to the position he held at the time of his retirement five years ago.

Industrial and Financial News

Metal Developments

According to an item in the daily press, an engineer of Coventry, Warwickshire, England, is reported to have perfected a process for the **jointing of light aluminum alloys** by means of a new welding material known as **Alusol.** The process is said to be analagous to soldering except that no flux is required.

Nearly a **million pounds of copper** are used by the mechanical refrigerator industry every week, according to an article on Refrigeration appearing in the forthcoming issue of the Minute Man, a periodical published by Revere Copper and Brass, Inc., New York Central Building, New York City.

Thin aluminum foil has been found to be a highly efficient insulator in experiments being conducted in the torrid heat of Egypt, where the tests include the use of the metal in tropical helmets, linings of tents and corrugated iron buildings. A report on these tests was published in the Bulletin of Hygiene, published in London, England, written by Dr. G. P. Crowden of the London School of Hygiene and Tropical Medicine.

In addition to the large number of courses given by the **Department of Educational Work** of the **Metropolitan Museum of Art,** 82nd Street and 5th Avenue, New York, the Museum offers in the Department of Industrial Relations, several courses of combined classroom and gallery talks on the Principles of Design. Walter Kantack will deliver one of the lectures on **Industrial Design Today: Metals.**

Aluminum is playing an important part in the passenger car Diesel engine. By its use this normally heavy engine has been brought down in weight to approximately the same as a gasoline engine. In the Cummins engine in which an Auburn car recently traveled from New York to Los Angeles for a total fuel cost of $7.62, the cylinder blocks, crankcase, cylinder head and valve cover are all of Bohnalite aluminum alloy castings.

Many new materials and new industrial manufacturing processes will be displayed at the third **Industrial Materials Exhibit,** to be held in the Hotel Astor, New York, October 21-25. This Exhibit is independently sponsored by a group of more than 40 manufacturers in a variety of industries.

A **silverware manufacturing company** in New York City engaged in making silver plated ware, has been directed to discontinue the use of the words "Sheffield" and "Sheffield Reproductions" to describe silverware not reproduced in accordance with the processes used by silversmiths in Sheffield, England, in the manufacture of Sheffield silverware and Sheffield plate, and to discontinue the use of the word "Sheffield" to designate ware not manufactured in Sheffield, England.

Mueller Brass Financing

The **Atlas Corporation,** New York, is acquiring at par for investment a $630,000 funding bond issue of the **Mueller Brass Company,** Port Huron, Mich., and is also acquiring options to purchase 54,200 shares of its common stock.

The bond issue is convertible into common stock on the basis of seventy common shares for each 1000 of bonds.

In addition to selling the refunding bonds to Atlas, O. B. Mueller, president of Mueller Brass, and members of his family have sold 40,000 shares at 14¼ a share to Hegarty, Conroy & Company, Inc.; to be offered to the public.

The refunding issue consists of $630,000 first mortgage five-year 5 per cent convertible bonds dated Oct. 1, 1935, and due on Oct. 1, 1940.

Business Items-Verified

Pre-Metals, Inc., Utica, N. Y., has been organized to manufacture salts and solutions for plating palladium and gold. They will also engage in trading in precious metals and ore of all types. **Harrison S. Sweet** is president; **Daniel H. Wetzel,** secretary; **Leo J. Oster,** treasurer; **Mitchell I. Liebenson,** vice-president and general manager. The works and laboratories are in Utica, under the control of **Daniel Gray,** chief chemist. New York office has been located at 120 Wall Street with Mr. Liebenson in charge. The company is interested in buying precious metals and ores in all forms.

Aluminum Industries, Inc., Cincinnati, Ohio, manufacturers of Permite products has opened a new office in Suite 1004, Petroleum Building, 616 South Michigan Avenue, Chicago, Ill., and **R. L. Corey** and **N. R. Patterson,** will be located in this office.

F. Blumenthal is interested in obtaining American industrial articles for export to Holland. He is working through the wholesale firm of J. Schutz, 841 Prinsengracht, Amsterdam, Holland.

George Mallick and Company, 2245 Ocean Avenue, San Francisco, Calif., are interested in obtaining catalogs of all types of metal manufacturing equipment and supplies; also electroplating equipment and supplies.

International Nickel Company of Canada, Ltd., 67 Wall Street, New York, is about to erect a chemical and research laboratory at Copper Cliff, Ontario, Canada. This laboratory will deal with projects leading to improvements in the processes for refining nickel and copper and the development of new uses for copper.

Inventions Digest, Inc., 310 S. Michigan Avenue, Chicago, Ill., services manufacturers by furnishing them with the latest information concerning American inventions. This information is obtained through the co-operation of patent attorneys in all parts of the country, who list their clients' inventions. The service has now been expanded to include inventions from several European countries.

Alrose Chemical Company, Providence, R. I., reports the growing popularity of the new Jetal process as a substitute for other black and oxidized finishes and as a bond for enamels, lacquers, japans, etc.

Wilbur B. Driver Company, Newark, N. J., manufacturers of Tophet, Cupron and other resistance alloys, announce that **Erich Fetz** has joined their metallurgical staff as research metallurgist. Mr. Fetz has had extended metallurgical experience in this country and abroad.

The **Colonial Brass Craftsman, Inc.,** New Haven, Conn., have been incorporated with a capital of $50,000 with a par stock valued at $100, and paid in stock of $3,100. Incorporators are R. O. and Ethel Abbott, and E. E. Jansson. The following departments will be operated: brass machine shop, cutting-up shop, spinning, soldering, brazing, plating, polishing, lacquering and japanning.

Moore Enameling and Manufacturing Company, West Lafayette, Ohio, is building an addition to its plant which will provide 10,000 ft. additional floor space, to be used for storage and shipping department. The following departments are operated by this firm: spinning and stamping.

Electrolux, Inc., 500 Fifth Avenue, New York City, makers of vacuum cleaners, parts, etc., have let contract for a new two-story addition to this plant on Tomac Avenue, Old Greenwich, Conn., 100 x 141 ft., also another addition 61 x 64 ft. respectively, the first to be used for a new factory unit and the other structure for office and operating service. Cost, over $100,000 with equipment. This firm operates the following departments: tool room, stamping, plating and polishing.

The **Liberty Smelting and Refining Company,** 3340 West 31st Street, Chicago, Ill., smelters and refiners of white metals, have acquired the property located at 1925-27 Mendell Street, a two-story brick building with warehouse space of 24,000 sq. ft. adjacent to dock facilities and the Chicago Northwestern siding. This firm operates a smelting and refining department.

John Arehart, Lowell, Mich., formerly manager of Lowell Manufacturing Company, and associates have organized a new company to manufacture sprayers and other metal products. Local property is being acquired. Plant will be equipped and placed in operation soon. Mr. Arehart will be treasurer and general manager of the new organization; C. H. Runciman, Lowell, will be president. This firm will operate the following departments: tool room, cutting-up shop, stamping and soldering.

The Franklin Smelting and Refining Company, Castor Avenue east of Richmond Street, Philadelphia, Pa., has been organized by **Herman Ladenson** and **Louis Schwab.** It will occupy a modern plant covering three acres. The plant, it is stated, will have a capacity of 50,000,000 pounds per year of finished copper, zinc, lead, antimonial lead, aluminum, brass and bronze ingots, solder, babbitt and special alloys. Mr. Schwab was formerly secretary and treasurer of the Girard Smelting and Refining Company, Philadelphia, and Mr. Ladenson is president of the Ladenson Metals Corporation.

The Belke Manufacturing Company has opened a branch office at 1627 West Fort Street in Detroit, under the management of **Roy A. Johnson,** who is well known in the electroplating industry.

Magnus Company, Inc., is erecting a plant in the Bandini industrial district of Los Angeles, Calif. The plant, it is stated, will have a capacity of 1,000,000 pounds of brass castings per month. **F. R. Nagel** is resident manager.

Miller Hydro Company, Bainbridge, Ga., is contemplating the installation of a small nickel plating plant and are interested in receiving information on the methods and equipment involved.

Chrome Plating Company, Milwaukee, Wis., has located a plant for heavy industrial chromium plating at 903 North Williams Avenue, Portland, Oregon. **A. F. Francis** is president and **Joseph Briody** is to superintend the operations. Pacific Coast sales will be in charge of **Ray Sette.** Work will be confined to heavy steel shaftings and similar industrial machinery.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

October 1, 1935.

Local heads of brass concerns, including **John H. Gross,** vice president of the **Scovill Manufacturing Company,** and **John A. Coe,** president of the **American Brass Company,** last month denounced and branded as false, reports spread through the country by a news service to the effect that the local concerns were humming with orders for munitions for Italy and Ethiopia.

Both officials said that not only are they not making any munitions but that they are not selling any products to concerns that might make them into munitions for those countries. They declared their concerns are living up to the spirit as well as the letter of the embargo on munitions. Mr. Goss said a tentative order was placed with his concern that appeared as though it might be designed indirectly for munitions for Italy and it turned it down. Both officials said that business is the best it has been in a number of years but that it is due to a gradual improvement and to domestic orders and is in keeping with the normal increase throughout the country. They said that they are so well satisfied with domestic orders for normal industrial requirements that they would not be interested in foreign munition orders. Mr. Goss positively denied a report, spread by the news service and published in papers in New York, Philadelphia and Boston, that the Scovill Company is moving, from the buildings used for the manufacture of munitions in 1914-1918, machinery now used for making novelties so that munition-making machinery could be installed there. The novelty business is so satisfactory that there would be no incentive to change over the machinery, he said.

One of the amusing features of the news reports mentioned was the statement that the local mills were working 24 hours a day, as proving unusual activity here. Naturally, all casting shops and rolling mills work 24 hours a day, when they work at all.

The Chamber of Commerce report for August shows 29,172 persons employed in industries employing 65 or over, an increase of 554 compared with July and an increase of 387 compared with August, 1934. In the eight largest factories, 15,381 were employed, an increase of 366 compared with the previous month and an increase of 95 compared with August, 1934. Bank clearings showed an increase of $132,000 over July and an increase of $998,700 compared with August 1934. Consumption of electricity showed an increase of 1,046,209 KWH compared with July and an increase of 1,799,790 compared with August 1934.

The **Beardsley & Wolcott Manufacturing Company,** which has been operating under a Federal receivership for some months, was shut down last month and the trustees appealed to the United States District Court to return the property to the Court. About 140 persons were employed when it closed.

Improved business in local brass plants is indicated by the advance in price of local stocks. Scovill has advanced from 19 to 27 since January; Anaconda, owner of American Brass, from 8 to 19 and Kennecott, owner of Chase Co.'s from 19 to 27.—**W. R. B.**

Connecticut Notes

October 1, 1935.

BRIDGEPORT — The **Bridgeport Brass Company** directors ordered a quarterly dividend of 10 cents a share paid on Sept. 30 to stock on record Sept. 13. The company is having plans prepared for a large addition to the plant.

Weekly payrolls in this city averaged $874,240 during July, according to the Chamber of Commerce report, and were the highest of any month since 1930. The average for July 1934 was $719,997 weekly. Bank clearings for July this year were $8,035,731, an increase of 17 per cent over July last year.

NEW BRITAIN—The **North & Judd Manufacturing Company** reports earnings, after reserves for taxes and depreciation but before dividends, of $165,480 for the year ending June 30. This compares with $177,544 for the previous year. Dividends paid amounted to $100,000 for both years. The gain to the surplus account this year was $64,646, the surplus now amounting to $627,474. Total assets, less reserves of over $600,000, are $3,313,712.

Fafnir Bearing Company employees will receive their third bonus of the year on Oct. 15. About 1,200 employees will benefit. Each will be based on a percentage of the total earnings of each individual for July, August and September. It is expected to amount to more than five per cent of such earnings.

HARTFORD—Samuel M. Stone, president of the **Colt's Patent Fire Arms Manufacturing Company** says there is not the least truth in the report that a large munitions order has been placed with them from Ethiopia.

Union members employed at the **Hamilton Standard Propeller Company** and its parent company, **Pratt & Whitney Aircraft Company,** numbering about 1,800, went out on a strike last month on the ground that five employees of the former company had been discharged because of unon activities. The union men said they would return as soon as the five are reinstated; that they would be willing to accept division of work during slack periods to make lay-offs unnecessary, and that their recent request for a 10 cents an hour increase was not an issue in the dispute.

BRISTOL—The **Bristol Brass Corporation** directors ordered a dividend of 37½ cents a share paid on Sept. 14 to stock of record, August 31.

The local real estate board is planning to organize an association similar to the **Industrial Properties, Inc.** of Waterbury to bring small industries to the city to take over some of the vacant factories. The plants of the **American Silver Company** and part of the plant of the **Wallace Barnes Company** are among those in mind. Such an association in Waterbury has already brought about 20 small industries into town and leased or sold to them parts of as many factories.

TORRINGTON — The **Torrington Company** directors have declared the regular dividend of $1 a share payable Oct. 1 to stock of record Sept. 20. The company has acquired, through an exchange of stock, the **Bantam Ball Bearing Company** of South Bend, Ind. The latter concern was formerly located at Bantam, Conn. but moved to Indiana because of a dispute over taxes. **K. L. Herrman,** who has been general manager of the concern, will continue to act in that capacity and it will be continued in operation with no change in personnel.

MERIDEN—The **International Silver Company** directors have declared the usual dividend of $1 a share on the preferred, payable Oct. 1 to stock of record Sept. 14.

The average weekly payroll in this city in the 25 largest establishments in July was $116,198 compared with $105,944 the previous month. Average weekly man hours were 205,010 against 201,025. Five plants in Wallingford had average weekly payrolls in July of $42,787 compared with $43,133 in June. Average weekly man hours was 79,301 compared with 81,156 in June.

WINSTED.—In our September issue the following statement appeared: "The Hudson Wire Company is now producing electric coils to be used in power units for model airplanes."

This statement was in error. The facts are that in connection with the Connecticut Tercentenary, there is on display in this city, an exhibit of the products of the different Winsted manufacturers, Hudson wire being one of the various displays. The exhibit has been the subject of several newspaper write-ups. There is also an exhibit of coils manufactured by Walter V. Davey, also of Winsted, part of his display being a small model airplane fitted with a power unit to operate it. However, while Mr. Davey buys wire from the Hudson Company, he and his coil business are in no way connected with this company. The airplane item, equipped with coil is Mr. Davey's product.—**W. R. B.**

Providence, R. I.

October 1, 1935.

The month just closing has just witnessed a tightening up of loose ends in the various branches of the metal trades in this area and preparations completed for the fall campaign. There have been extensive overhauling of plants, some additions to buildings and equipment and several concerns have already increased the number of their employees. The month has marked a slight improvement; but slight though that improvement be, and seasonal though it is, there is a general spirit of encouragement, a healthy optimism that portends an active closing of the year with returns from the next three months that will bring the year to a more satisfactory conclusion than has been the case for several years past.

Following the report of **Fergus J. McOsker,** receiver for the **Providence Metal Frame Company,** of Providence, the Superior Court has entered a final decree allowing him compensation in $400 for services and $50 for counsel fees, and ordering distribution of the balance in hand and dissolution of the business as a corporation.

Charles A. Whiting, president of the **Whiting & Davis Company,** of Plainville, has announced the appointment of **Miss Bissell Brooke** as director of publicity for that concern. Miss Brooke has established an office and display bureau in New York and will conduct a national promotion campaign on mesh products.

The **B & B Plumbing Supply Company,** of 339-341 South Main street, Providence, is owned by **William T. Smith,** according to his statement of ownership filed at City Hall.

The **Bojar Manufacturing Company,** and the **Bojar Ring Company,** of 107 Stewart street are owned and conducted by **Leo Bojar,** according to his statement filed at the office of the City Clerk

Daniel Jacobs, 254 Camp street, Providence; **A. M. Nolan** and **M. E. Sullivan,** also of Providence, are the incorporators of **Bojar & Karasik, Inc.,** of Providence, that has been granted a charter under the laws of Rhode Island to conduct a manufacturing jewelry business with an authorized capital consisting of 100 shares of common stock of no par value.

The regular monthly meetings following the summer recess were resumed Sept. 4 by the **Metal Findings Manufacturers' Association.** The meeting and luncheon were held in a private dining room at Narragansett Hotel, President **E. E. Baker,** presiding with a good number of members attending. Routine reports were presented, plans for the fall and winter were discussed and matters pertaining to the association's membership were considered.

The **Hingeco Manufacturing Company,** manufacturers of jewelers' findings, vanity and cigarette cases, has removed its plant from 66 Gordon avenue to Amherst street and Tuxedo avenue, where it has purchased a large mill building and is remodelling it.—W. H. M.

Middle Atlantic States

Utica, N. Y.

October 1, 1935.

Factory wheels are whirring faster in Utica this fall than they have in some time. Metal executives report that tons of manufactured products are being shipped from this center. Orders, they claim, are larger than last year.

The **Brunner Manufacturing Company** which makes a line of compressors and refrigerators reported business better than fall of 1934 and goods being shipped to England and the Continent. The **American Emblem Company** making novelties, premiums and radio escutcheons is considering putting on a night shift. Optimistic reports came from the **International Heating Company** and **Hart & Crouse.** Both of these factories manufacture heating equipment and air conditioning lines. The **Savage Arms Corporation** reported its business slightly better than last year.

The Industrial Association in Utica reported that for this section both foundry and metal groups are increasing in employment and hours.

An order signed by **Judge Henry W. Goddard** of the United States District Court for the southern district of New York on Sept. 13 completed the final step in the re-organization of the long established **Richardson and Boynton Company.** In 1937 the concern which makes boilers and warm air furnaces will observe its hundredth anniversary. At present the company's air conditioning products are in the laboratory undergoing tests. Officials claim the company is the oldest of its kind in the industry. Factories are located in Utica, Buffalo and Dover. The Dover foundry is devoted to making coal ranges. **D. R. Richardson** is president.

Federal Judge **Frederick H. Bryant** at Malone, Sept. 19 rejected a plan for reorganization of the **Rome Company, Inc.,** and issued an order adjucating the company to be insolvent and directing liquidation of its assets. The Rome Company in Rome, N. Y., makes metal furniture. Oct. 3 was set as the date for the consideration by creditors of an offer by the **Rome Products Corporation** of New York. This latter firm was formed expressly to purchase and take over the business paying $275,000 for all assets excepting cash, receivables and real estate.

Evidence was taken showing that the company had a gross recoverable liquidating value of $942,000 which if liquidated by the company itself would leave as net $793,000. This figure included accounts receivable of $350,000, inventory of $250,000 and plant after depreciation, about $225,000.

Judge Bryant rejected the re-organization plan as not workable because of lack of provision for credit and additional capital.—E. K. B.

Newark, N. J.

October 1, 1935.

The **American Can Company,** 230 Park Avenue, New York, will make alterations to its factory on Avenue L to cost $30,000. The former plant of the **Barth Reflector Company** on Verona Avenue, has been sold by the Fidelity Union Trust Company, to a Hoboken concern.

The **International Nickel Company** of New York, will erect a laboratory and research building at Bayonne to cost $30,000.

The **American Brake Shoe and Foundry Company,** Park Avenue, New York, will erect a plant addition at Maurer, N. J.

The following Newark concerns have been chartered; **Sal-Mar Laboratories, Inc.,** radio tubes, 150 shares, no par; **Metals, Inc.,** metal products 500 shares, no par; **Harris Alloys, Inc.,** metal products 1000 shares, no par.—C. A. L.

Trenton, N. J.

October 1, 1935.

There has been little change in the metal situation in this vicinity during the past month, but some concerns report business showing an increase. The **Edgely Brass Company,** Edgely, Pa., operated by Trentonians, reports that business shows no increase.

Solfo Paint & Chemical Company, 821 Pennington Avenue, is having an addition erected to its plant at a cost of nearly $30,000.

Following concerns have been incorporated here; **Charles F. Knapp, Inc.,** electric welding, Montclair, 1,000 shares, no par; **Spray Chemical Company,** Paterson, 100 shares, no par; **R. Hutchinson, Inc.,** brass foundry, Perth Amboy, $100,000; **Carbogen Chemical Co.,** Elizabeth, $50,000; **Union Plastics Company, Inc.,** Hillside, 500 shares, no par; **Federal Machine Products Corporation,** metal castings, Montclair, 100 shares, no par.—C. A. L.

Middle Western States

Detroit, Mich.

October 1, 1935.

Industrial conditions as they effect non-ferrous metals are the most favorable this area has experienced in more than five years.

At present, however, the majority of the big plants are marking time and preparing for an early resumption of activity. It is expected that heavy operations will be under way a month or six weeks in advance of previous fall seasons.

The motor car industry just now is getting in shape for production of the early models.

The plating plants also are preparing for a heavy run of business which will be resumed as the demand starts from the automotive plants.

Thus far none of the non-ferrous metal plants here have been stirred to action by the Italian war scare. That type of production is not particularly desired by any one in this territory.

Manufacturers of refrigeration units have been active all through the summer, with little probability of tapering off during the fall and winter.

It might be well to add that floating labor is in no demand whatever. Detroit has plenty of its own workers to meet all present requirements.

The **Bohn Aluminum & Brass Corporation** here will decide within the next few months on one of several proposals for large-scale production of aluminum from alunite ore deposits in Utah and Colorado, according to **Charles B. Bohn,** president. He recently returned from a trip through the section where the organization plans its development. Utilization of power from Boulder Dam is being considered. Mr. Bohn stated that a mill will first be set up to produce 60,000,000 pounds of aluminum. Once this is completed and proves successful additional mills will be constructed to produce the entire requirements of the organization. More than a year would be required to build the first mill and get it into operation, it is said.

More than 10,000 men will have continuous employment during the last few months of 1935, according to **Harlow H. Curtice,** president and general manager of the **Buick Motor Company.** The extensive expansion program carried on during the last 18 months, involving an expenditure of more than $14,500,000, has been accomplished with little loss of time to Buick productive workers.

Outlook for the **Hayes Body Corporation,** at Grand Rapids, is announced as the brightest within the last six years. Tools and dies for the 1936 models are now being prepared. When the plant's four-body assembly lines are in full operation, it can turn out a new body every five minutes. Officers of the organization are: president and treasurer, **A. A. Anderson;** vice-president and general manager, **E. J. Connelly;** secretary and assistant treasurer, **O. W. Birnie;** comptroller, **J. H. Lee.**

Thurlo G. Masters, 1205 Pallister avenue, Detroit, has recently incorporated the **Master Chrome Platers Company.**

The first commercial application of a new rust-proofing process, is announced by the **Chevrolet Motor Company,** with the installation of special equipment for the "cromodizing" of fenders, running boards and other sheet metal parts. The new process, it is stated, differs from others used in the motor car industry, in that the rust-proofing is accomplished as the parts pass on a conveyor through a series of spray booths, and the treatment, instead of forming a brittle coating over the surface, combines with the metal and changes it chemically to form a rustproof surface.

Just how far the **Ford Motor Company** has gone with welding was shown in a recent checkup of the number of welds in a Tudor sedan. There were in all 3,415 welds in the body and chassis exclusive of other welding operations in the manufacture of such components as generator, lamps, horns and distributor. Of these 3,415 welds, 3,154 were electric spot welds, 217 were electric arc or oxy-acetylene welds, and 44 were electric butt welds. Furthermore the number of welding operations on the Ford V-8 is increasing almost weekly. Many of the welding machines used by the Ford organization were designed and built in the Ford shops because no one ever had made such machines.—F. J. H.

Chicago, Ill.

October 1, 1935.

Greatly increased sales of time clocks in the Chicago area are reported by leading manufacturers. An increase of 82 per cent in sales volume is reported by the **International Time Recording Company,** 233 West Madison Street. The Chicago office of the **Cincinnati Time Recorder Company** is enjoying an 81 per cent gain.

Twenty-five per cent of the machinery of the **Bendix Products Corporation** has been removed from the South Bend plants to an unnamed destination in anticipation of labor troubles, officials of the company stated. No further removal of machinery is expected. Although union workers have demanded higher wages and more favorable seniority rights, the union has made no strike threat. It is said that the trouble is due to a small group of agitators.

Russell G. Creviston of the **Crane Company,** has been elected president of the new housing display conference formed under the sponsorship of the treasury department.

The **Pee-Cee Manufacturing Company,** Fairfield, Ill., manufacturer of automotive specialties and parts is anticipating an increased volume of winter business. An increased advertising appropriation is planned.

Jay C. Parsons, president of the **Wahl Company,** since May, 1929, died recently. Interment was at Caney, Kansas.

The **Portable Elevator Manufacturing Company,** Bloomington, Ill., is manufacturing a new bottled beverage cooler and dispenser.—R. G. K.

Pacific States

Los Angeles, Calif.

September 23, 1935.

The **Studebaker Corporation,** automobile manufacturers, of South Bend, Ind., have taken over a tract of land here at 46th St. and Loma Vista Ave. and will build a large plant, to be 740 x 143 feet in size, to have 109,300 square feet of space.

There is a fight on as to use of copper or aluminum for the conductors in the 237 mile power transmission line, for the Colorado River aqueduct pumping plant. This contract is to cost $220,000. Copper is favored as it is a western product.

The **Sterling Electric Motors,** are to build a large addition to their factory, at 5401 Telegraph Road, Montebello, to cost $40,000.

The **Welcome Meter Company,** of Pasadena, have started in business, making all kinds of meters.

The **Reynolds Metals Company** of 912 East 3d St., are in production of steel lath, tin, lead, aluminum and zinc foils.

The **National Postal Meter Company,** a new firm at 142 West Slauson Ave., have built a plant and is now in production on a special made postal meter machine, which handles, stamps and counts 12,000 envelopes an hour, also seals the envelopes.

The **National Cable & Metal Company,** Paul Gilpin at head, have started a factory at 1725 Standard St., Glendale, to make non-corrosive storage battery terminals.—H. S.

North Pacific

September 23, 1935.

The **Boeing Aircraft Company** of Seattle have spent a year on building for the Army, the largest bombing land plane made in the U. S., **having four motors,** fifteen tons, 105 foot wing span, cost $500,000, cruising at 200 miles an hour, the first ship to have air brakes

The **Brown Metal Works** of Spokane, Wash., have started making all aluminum truck bodies. These bodies through the light weight, can carry considerable more pay load.

The **Electrogas Furnace & Manufacturing Company** of 2575 Bay Shore Blvd., San Francisco, are making air conditioning equipment as a new line, in addition to their old line of heating equipment.

The **National Gas Equipment Company** of 1123 Harrison St., San Francisco, are now making a new gas burner.

The **Bowie Switch Company,** the largest manufacturers in this line in the country, are at 19th & Tennessee Sts., San Francisco. They made recently twelve transmission lines for the government, for the Hoover Dam, made of copper, silver and bronze. The contact surface was made of pure silver, instead of copper.

The **Pacific Electric Corporation** of 5815 3d St., San Francisco, are now in large production of carpet washing machines.—H. S.

Metal Market Review

October 1, 1935.

Copper was one of the outstanding bulls of the month, perhaps not so much because of the amount of its rise but also because of the steadiness and certainty with which it made its step upward. The first two weeks it rested at 8.50. From the 16th of the month to the end it sold regularly for 9.00. At all times buying was steady and the undertone firm.

Zinc was also strong in very much the same fashion as copper. It sold for 4.60 until the 19th when it was advanced 15 points to 4.75 for Prime Western f.o.b. East St. Louis.

The tendency seems to be toward strength in both of these basic metals, partly because of improved industrial conditions in the United States and partly because of the strong demand abroad for war purposes.

Cadmium, one of the important by-products of zinc, has jumped to 85c from the year's low of 55c.

Tin showed little tendency in any direction. It began the month at 48.875 for straits, went as low as 48.25 but rose again in small fluctuations, closing at 50.25. It was unsettled to dull the first two weeks, quiet, the third and moderately active toward the end. Some of the unsettlement may be due to the fact that the tinplate industry in the United States is comparatively slow, operating at about 50 per cent capacity during the latter part of the month.

American consumption for the year ending July, 1935 gained 2.3% over the year ending July 1934.

Lead was another strong performer. It rose from 4.20 at the beginning of the month to 4.25 (f.o.b. St. Louis) on the 18th, 4.35 on the 19th at which point it remained. Sales were low at the beginning of the month, increased in the second week, became very heavy in the third week, and were in very fair volume at the end.

Aluminum—unchanged at 22 cents.

Nickel—also unchanged at 35 for electrolytic.

Antimony was very strong, opening the month at 13, rising to 13.50 on the 16th, 13.75 on the 18th and 14.25 on the 23rd where it remained. This later activity is undoubtedly due to war needs abroad.

Silver established a new record for itself, remaining at the same place for the entire month, 65.375. Comparatively little business was transacted and the tendency remained steady. The United States Treasury was reported to have given not much buying support to the market.

American production amounted to 3,352,000 ounces in July compared with 2,387,000 in June. In the same period, world production increased from 15,009,000 ounces to 16,932,000.

Platinum hopped from $31 to $34 an ounce, on September 3rd and remained there for the balance of the month.

Gold—unchanged at $35.00, United States Treasury price.

Scrap Metals necessarily followed the primary material. They were steady during the first week. In the second, they firmed up, brass ingot gained half a cent and aluminum also gained. Later, scrap bids rose a little more with brass ingot demand fair and aluminum also gaining. At the close, copper and brass scrap were still firm but the aluminum undertone was slightly weaker and brass ingot bookings slower.

Non-Ferrous Ingot Metal Institute reports the average prices per pound received by its membership on Commercial Grades of six principal mixtures of Ingot Brass during the twenty-eight day period ending September 6.

Com. 80-10-10 (1½% Imp.)	9.375c
Commercial 78% Metal	7.041c
Commercial 81% Metal	7.286c
Commercial 83% Metal	7.673c
Commercial 85-5-5-5	7.925c
Commercial No. 1 Yellow Brass	6.334c

The combined deliveries of brass and bronze ingots and billets by the members of the Non-Ferrous Ingot Metal Institute for the month of August, 1935, amounted to a total of 5,297 tons.

Wrought Metal Market

The brass mills are showing steady improvement. It has been estimated that their business is about 10 per cent ahead of a year ago. It is not so much the percentage that is important, as the fact that the business is steady and the forward bookings good.

The report that Connecticut Valley plants have been very active on war orders, munitions, etc., has been hotly denied by some of the largest interests in that district. They state that their activity is strictly industrial and that the increase in their business, while good, is not nearly enough in volume as to be traceable to munition orders.

A large Metropolitan distributor reports that September was about 10% ahead of August, and also about 10% ahead of September, 1934. Prospects are encouraging.

Daily Metal Prices for September, 1935

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	2*	3	4	5	6	9	10	11	12	13	16	17
Copper c/lb. Duty 4 c/lb.												
Lake (del. Conn. Producers' Prices)		8.625	8.625	8.625	8.625	8.625	8.625	8.625	8.625	8.625	9.125	9.125
Electrolytic (del. Conn. Producers' Prices)		8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	8.50	9.00	9.00
Casting (f.o.b. ref.)		8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.125	8.125	8.60	8.60
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.		4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.60	4.75
Prime Western (for Brass Special add 0.05)												
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits		48.875	48.55	48.70	48.50	48.40	48.25	48.55	49.00	49.125	49.625	49.50
Lead (f.o.b. St. L.) c/lb. Duty 2½ c/lb.		4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20
Aluminum c/lb. Duty 4 c/lb.		22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Nickel c/lb. Duty 3 c/lb.												
Electrolytic 99.9%		35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.		13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.00	13.50	13.50
Silver c/oz. Troy, Duty Free		65.375	65.375	65.375	65.375	65.375	65.375	65.375	65.375	65.375	65.375	65.375
Platinum $/oz. Troy, Duty Free		31.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
Gold—Official Price[1] $/oz. Troy		35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

	18	19	20	23	24	25	26	27	30	High	Low	Aver.
Copper c/lb. Duty 4 c/lb.												
Lake (del. Conn. Producers' Prices)	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	8.625	8.90
Electrolytic (del. Conn. Producers' Prices)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	8.50	8.771
Casting (f.o.b. ref.)	8.60	8.60	8.60	8.60	8.60	8.60	8.60	8.60	8.60	8.60	8.00	8.342
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.75	4.60	4.675
Prime Western (for Brass Special add 0.05)												
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	49.25	49.20	49.00	48.75	48.875	49.50	49.65	49.875	50.25	50.25	48.25	49.071
Lead (f.o.b. St. L.) c/lb. Duty 2½ c/lb.	4.25	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.20	4.264
Aluminum c/lb. Duty 4 c/lb.	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00	22.00
Nickel c/lb. Duty 3 c/lb.												
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	13.75	13.75	13.75	14.25	14.25	14.25	14.25	14.25	14.25	14.25	13.00	13.537
Silver c/oz. Troy, Duty Free	65.375	65.375	65.375	65.375	65.375	65.375	65.375	65.375	65.375	65.375	65.375	65.375
Platinum $/oz. Troy, Duty Free	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	31.00	33.850
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

[1] U. S. Treasury Price. * Holiday.

Metal Prices, October 1, 1935

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 9.125, Electrolytic 9.00, Casting, 8.60. **Zinc:** Prime Western, 4.75. Brass Special, 4.85. **Tin:** Straits 50.15. Pig 99%, 49.50. **Lead:** 4.35. **Aluminum,** 22.00. **Antimony,** 14.25. **Nickel:** Shot, 36. Elec., 35.

Quicksilver: Flasks, 75 lbs., $69.50. **Bismuth,** 90c. **Cadmium,** 85c.: **Silver,** Troy oz., official price, N. Y., October 1, 65⅜c. **Gold:** Oz. Troy, Official U. S. Treasury price, October 1, $35.00. **Scrap Gold,** 6¾c. per pennyweight per karat, dealers' quotation. **Platinum,** oz. Troy, $34.00.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free, lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U. S. Import Duty	Tax*
Brass Ingots, Yellow	7.25 to 8	None	4c. lb.[1]
Brass Ingots, Red	9 to 11	do	do
Bronze Ingots	10½ to 12	do	do
Aluminum Casting Alloys	16 to 20½	4c. lb.	None
No. 12 Aluminum Ingot	16 to 17¼		
Manganese Bronze Castings	20 to34	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	26 to38	do	do
Manganese Bronze Ingots	10 to13	do	4c. lb.[1]
Manganese Copper, 30%	11½to16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	10 to12	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	13¼to15	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	11½to14	do	do
Phosphor Tin, no guarantee	61to75	None	None
Silicon Copper, 10%	18 to30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$36.50	None	None
Iridium Platinum, 10%	$37.50	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6½to 6¾	Free	4c. per pound on copper content.
Light copper	5¾to 6	Free	
Heavy yellow brass	3⅝to 3⅞	Free	
Light brass	3 to 3⅛	Free	
No. 1 composition	5½to 5¾	Free	
Composition turnings	5⅜to 5⅝	Free	
Heavy soft lead	3½to 3⅝	2⅛c.lb.	
Old zinc	2.60to 2¾	1½c.lb.	
New zinc clips	3.45to 3.60	1½c.lb.	
Aluminum clips (new, soft)	14 to14.25	4c.lb.	
Scrap aluminum, cast	11¾to12	4c.lb.	
Aluminum borings—turnings	6¼to 6½	4c.lb.	None.
No. 1 pewter	30 to31	Free	
Electrotype	3⅝to 3¾	2⅛c.lb.*	
Nickel anodes	28½to29½	10%	
Nickel clips, new	32 to34	10%	
Monel scrap	13 to19	10%a.v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since September 17, 1935. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	16 c.	2½c lb.
Bare wire, soft, less than carloads	12¾c.	25% a. v.
Seamless tubing	16½c.	7c lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	
Sheet	14¾c.	15¼c.	16⅛	4c. lb.	U. S. Import Tax 4c. lb. on copper content.
Wire	14⅞c.	15¾c.	16⅝	25%	
Rod	12⅞c.	15¾c.	16½	4c. lb.	
Angles, channels	22⅜c.	23½c.	24⅛	12c. lb.	
Seamless tubing	16⅜c.	17 c.	17⅞	8c. lb.	
Open seam tubing	22⅜c.	23½c.	24⅛	20% a. v.	

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	23⅝c.	10% Quality	26½c.
15% Quality	25¾c.	15% Quality	30⅞c.
18% Quality	27 c.	18% Quality	34⅛c.

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	16½c.
Muntz or Yellow Rectangular and other sheathing	17⅝c.
Muntz or Yellow Metal Rod	14 c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	32.80
Aluminum coils, 24 ga., base price, tons lots, per lb.	30.50

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	53c.
Hot Rolled Rods	45c.	Standard Sheet	48c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	35	Standard Sheets (base)	38
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	43

SILVER SHEET

Rolled sterling silver (October 1) 66c per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb.
Full Lead Sheet (base price)	8.00	2⅜c. lb.
Cut Lead Sheet (base price)	8.25	2⅜c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty Free)

This list applies to either block tin or No. 1 Brittannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 380.

Supply Prices, October 1, 1935

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets.

Copper: Cast ..... 15¾c. per lb.
Electrolytic, full size, 14c. cut to size 14 c. per lb.
Rolled oval, straight, 14½c.; curved, 15½c. per lb.
Brass: Cast ..... 14½c. per lb.
Zinc: Cast ..... .09⅛c. per lb.
Nickel: 90-92% ..... .45 per lb.
95-97% ..... .46 per lb.
99%+cast, 47c.; rolled, depolarized, 48.
Silver: Rolled silver anodes .999 fine were quoted October 1, from 68¾c. per Troy ounce upward, depending upon quantity.

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85
		Any Quantity		
4 to 6	Under ½,	$5.00	½-1, $4.85	1 to 3, $4.75
1½ to 4	"	5.55	" 5.40	" 5.35
1 to ½	"	5.85	" 5.70	" 5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick. On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less are quoted:

16" 20 ply 84/92 Unbleached	$76.30
14" 20 ply 84/92 Unbleached	58.51
12" 20 ply 84/92 Unbleached	44.01
16" 20 ply 80/92 Unbleached	63.81
14" 20 ply 80/92 Unbleached	49.02
12" 20 ply 80/92 Unbleached	36.96
16" 20 ply 64/68 Unbleached	56.32
14" 20 ply 64/68 Unbleached	43.32
12" 20 ply 64/68 Unbleached	32.72
½" Sewed Buffs, per lb., bleached or unbleached	48c. to 1.12

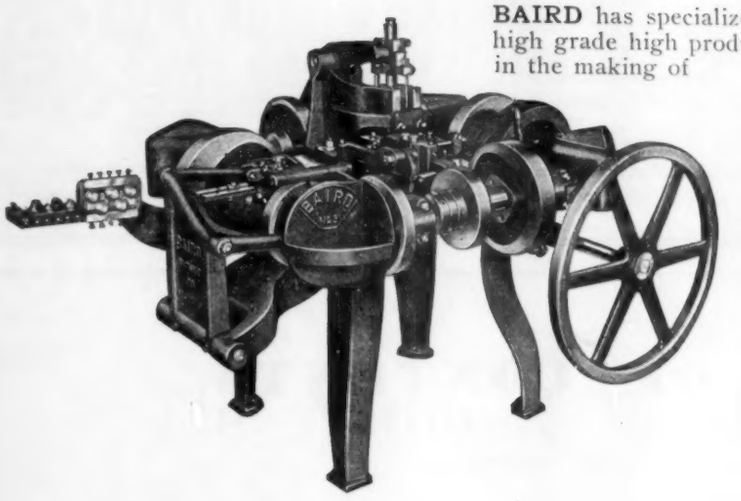
CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P.	lb.	.13½-.16
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.05¼-.05¾
Chromic, 400 or 100 lb. drums		.15¾
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl, drums	lb.	.13½-.14½
Denatured, drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¾-.04
Powdered, barrels	lb.	.0390-.0415
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.55-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.0245-.0295
Cadmium oxide, 50 to 1,000 lbs.	lb.	.85
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	21½-23½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.21
Carbonate, 53/55% cu., bbls.	lb.	.15½
Cyanide (100 lb. kgs.)	lb.	.38-.40
Sulphate, tech., crystals, bbls.	lb.	4.55-5c.
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs.,	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) 100% synth., drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 lb. bbls.	lb.	.13-.14
Salts, double, 425 lb. bbls.	lb.	.13-.14
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07¼-.08½
Potassium—Bichromate, casks (crystals)	lb.	.08½
Carbonate, 96-98%	lb.	.07½
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Gold Cyanide	oz.	$15.45*
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.08
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.53⅝
Cyanide, 100 oz. lots	oz.	.61-.63⅞
Nitrate, 100 ounce lots	oz.	.45⅝
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.17½-.22
Beryllium fluoride (2NaF. BeF_2)	lb.	4.30-7.00
Gold Cyanide	oz.	$17.10*
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.15-3.30
Nitrate, tech., bbls.	lb.	.02¼
Phosphate, tribasic, tech., bbls.	lb.	.0375
Silicate (Water Glass), bbls.	lb.	.01½
*Stannate, drums	lb.	.32½-.35½
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
*Tin Chloride, 100 lb. kegs	lb.	.37½
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Cyanide (100 lb. kegs)	lb.	.38
Chloride, drums, bbls.	lb.	.07½-.10
Sulphate, bbls.	lb.	.03-.037

*Subject to fluctuations in metal prices.

AUTOMATIC MACHINERY SINCE 1846



BAIRD has specialized in the design and construction of high grade high production machinery such as is required in the making of

Bails	Screw Hooks and Eyes
Chain	Safety Pins
Buckles	Fasteners
Terminals	Springs
Radio Parts	Bottle Openers
Clips, Hinges	Novelties
Bushings	Chain Rollers
Hairpins	Toilet Pins
Hooks and Eyes	Paper Clips
Connections	Thumbtacks
Upholstery Nails	Clothes Pins
Suspender Buckles	Rings, &c., &c.

This shows one of 12 different sizes of **BAIRD** Latest Design Automatic Four Slide Wire and Ribbon Metal Forming Machines, the most standard of such machines.

In addition we have many others too numerous and too varied to list.

BAIRD AUTOMATIC PRESSES. The picture shows a late design of press designed to lower production costs in cases where the article to be made requires several operations after blanking and where one press can be used on many such articles to be made in repeated runs and where a quick tool change is important in keeping the press in production the greatest length of time.

The tools are contained in one unit and we have made a tool change involving a **down time of only four minutes.**

BAIRD TUMBLING EQUIPMENT has been standard for about 40 years.

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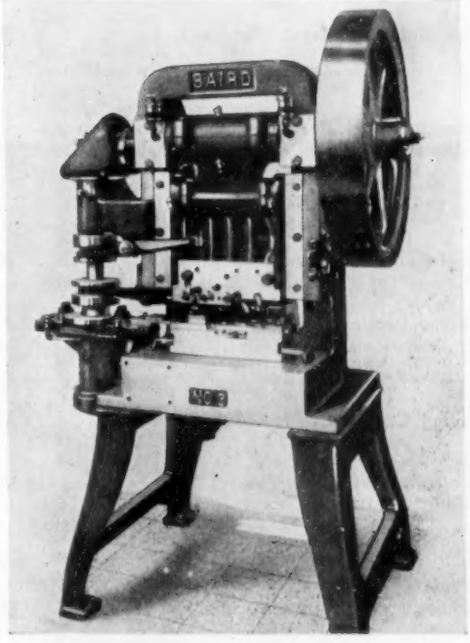

A BAIRD Automatic Multiple Transfer Press. Built in 6 sizes.
BAIRD has other designs of Automatic Presses for other purposes.

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